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THE
INTERNATIONAL CYCLOPÆDIA.

THE WORLD





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THE INTERNATIONAL CYCLOPÆDIA

A COMPENDIUM OF HUMAN KNOWLEDGE

REVISED WITH LARGE ADDITIONS

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IN FIFTEEN VOLUMES

Vol. I

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PREFACE TO THE REVISED EDITION.

THE present edition of the INTERNATIONAL CYCLOPÆDIA preserves in their entirety those features that in the past have won the commendation of all who have fairly tried it by the criterion of practical utility. At the same time, the work as a whole, in receiving the very large additions made necessary by the recent progress of the sciences, has undergone such essential modifications of its scope and plan as to have become in many of its most prominent details a new encyclopædia. For this reason, and in order that it may be judged by the standard of its own ideal, it seems desirable to indicate the purpose that its editors have had before them, and to state as concisely as possible the general plan and method that have been adopted.

Historically, there have been developed two definite and distinct conceptions of the ideal encyclopædic treatment. The so-called philosophic method, of which the elaborate *Encyclopædia Metropolitana* may be taken as a type, arranges the topics according to the department of knowledge to which each most properly belongs. Thus, one volume would contain all the articles relating to Pure Science, a second those relating to Applied Science, a third those relating to Biography and History, a fourth those relating to Geography, and other subjects in like manner. The lexicographical or alphabetic method, on the other hand, discards the arrangement by subjects, in favor of the much simpler, though less scientific grouping under a single alphabet. It is evident that the extreme convenience and simplicity of the alphabetic method, render it the only one that is possible for popular use; since to consult a work constructed on the philosophic plan requires a degree of special knowledge on the part of the reader such as very few are so fortunate as to possess. The second method, then, has almost universally prevailed, and is represented and embodied in such standard works as the admirable *Konversations-Lexikon* of F. A. Brockhaus, the *Dictionnaire Universel du Dix-Neuvième Siècle* of Pierre Larousse, and the *Cyclopædia* of Chambers which still enjoys an undiminished popularity.

It is a matter of interest to note, however, to what extent a feeling in favor of the philosophic method has unconsciously hampered the freedom of those editors who have avowedly rejected it. Although adopting the alphabetic arrangement, they nevertheless seem curiously anxious to consolidate their information under as few captions as possible, and also curiously unwilling to facilitate convenience of reference by a simple and rational subdivision of their leading topics. In other words, they have rejected the most commendable feature of the scientific mode of grouping, while retaining, to a great extent, the very ones that render it objectionable. For if an encyclopædia, though constructed on the alphabetic plan, still masses its information in a comparatively few ponderous and elaborate articles, the same general objection equally exists, since its knowledge is conveniently available to the specialist alone, while the average reader can find a particular topic only after a long and vexatious search. This objection, to be sure, is partially obviated by the somewhat awkward device of a general index; but even this is much less simple than such a division of subjects as would enable one who is in search of information to turn to it at once and find it given in succinct and intelligible form under the title that is most obvious and natural.

Something, also, of the old tradition which invested an encyclopædia with a factitious dignity, is still perceptible in the selection and rejection of their subjects by

many of the existing works. There seems to prevail a notion that certain fields of knowledge are more dignified than others; forgetting that the name *encyclopædia* itself expresses the whole range of man's intellectual activity, to which nothing can be truly alien. Here, again, the theory of the *Konversations-Lexikon* is better than the prevailing practice; so that perhaps the excellent compilation of Meyer is the only one that consistently and exhaustively carries out the true design of a popular encyclopædia.

This brief criticism will, perhaps, sufficiently explain in a negative way the general design of the new edition of the present work. Briefly stated, that design is (1), while treating each main topic with a reasonable degree of fullness under its own title, to set forth also in separate articles and under separate titles the essential facts regarding the several branches of the subject; besides multiplying cross-references to both text and illustrations to such an extent as at once to direct the reader to the precise information of which he is in need, so that each article may stand as a clew to all the others that are cognate; and (2), so far as is possible, to make the work in its wide range and diversity of subjects, that which its very name implies—a true Compendium of Human Knowledge.

In the accomplishment of this general purpose, the INTERNATIONAL has been subjected to a most thorough and detailed revision. The single task of making all the existing articles truly representative of the marvelous advance of modern scientific knowledge, and of the political, literary, and educational development that has characterized the past decade, would in itself involve a radical alteration of the subject matter. But much more than this has been actually done. While many of the former articles have been recast and thoroughly revised, many more have been entirely rewritten by specialists of established reputation, and upward of three thousand new titles have been added. In contemporary biography, and especially in contemporary American biography, it is believed that this cyclopædia is more comprehensive than any other existing work. Political topics, both American and foreign, have been made a very prominent feature of the revision, and are so treated that each separate subject, whether it be a great constitutional question or a popular catchword, may be found under its own proper title. Educational theories, with their most recent developments, are carefully described. The discussion of each important topic is supplemented by a bibliography of the latest standard works relating to it. The recent census enumerations in Russia (1886), Spain (1887), Switzerland (1888), Holland (1890), Belgium (1890), Austria (1890), Germany (1890), the United States (1890), Hawaii (1890), England (1891), France (1891), India (1891), and Canada (1891), have been used, so far as the official figures were available, to give the very latest statistical information. New illustrations, many of them in colors, have been added, as well as a complete set of railroad and county maps of the States of the American Union, and of the Provinces of the Dominion of Canada. Meteorology and its cognate topics are made both intelligible and interesting by a series of colored weather-maps and charts. It is impossible, however, to describe, even in the most cursory manner, the extent and variety of the specific changes that have been made. The revision, as it stands, represents the combined work of a staff of more than a hundred and fifty writers, besides the advice, assistance, and suggestion of a still larger number of others who have courteously lent their aid to the regular contributors. There are few pages of the fourteen thousand contained within these volumes, that do not show the hand of the reviser. More than a third are absolutely new.

An encyclopædia, like a lexicon, necessarily represents the garnered labor, experience, and knowledge of all like works that have preceded it. The editors of the INTERNATIONAL have endeavored to profit by whatever is most valuable in the many useful compilations that have been elsewhere published. The volumes of Brockhaus, of Meyer, of Larousse, of Pierer, of Chambers, and, in fact, of all the European scholars who have labored in this interesting field, have been many times consulted. To them a frank acknowledgment of obligation is cheerfully accorded. At the same time, however, it has been first of all the purpose of publishers and editors alike, to make the INTERNATIONAL before aught else a truly American encyclopædia, giving with fairness and fullness the information regarding American History, Geography, Politics, Biography, Science,

Art. and Literature, that American readers most desire. And it may be well to add, in view of the fact that contemporaneous questions of interest—political, social, economical, and religious—occupy so large a portion of its pages, that no partisan expressions have been permitted to appear. Statements of fact regarding which there can be no question are never coupled with mere opinions, which too often represent only the personal bias of an individual.

In so extensive a revision, embodying, as it does, contributions from many sources, it is impossible that inconsistencies should not be here and there detected. But the editors believe that these are few and unimportant; and with a feeling of confidence that, both in its purpose and in the accomplishment of that purpose, the work is worthy of success, they now submit it to the test that is of all the most searching and most satisfactory,—the test that lies in critical comparison and in daily use.

HARRY THURSTON PECK,
Editor-in-Chief.

PREFACE TO THE EDITION OF 1898.

It is now six years since the *INTERNATIONAL CYCLOPÆDIA* in its present form was given to the public. Since that time, owing to reasons which will be sufficiently obvious to all who are familiar with the history of works of reference, the progress of events has made inevitable a careful and systematic revision of certain departments, which from their very nature require frequent alteration or amplification. It has, indeed, been the settled policy of the publishers to correct from year to year those articles in which circumstances made immediate alteration imperative; but this work was special rather than general, and did not extend to whole departments. In putting forth the present edition, which embodies so much detailed revision, it seems desirable to indicate in a general way the nature of the work that has been done.

As in every similar book, the department of *BIOGRAPHY* is that which stood in need of most careful examination, especially in that portion of it which relates to living men and women. This whole department, therefore, has been critically examined; and new matter has been added from a great variety of sources, including information given by the subjects of the articles. In the case of persons who have died since the last edition of the *Cyclopædia* was issued, that fact and the date of each death have been inserted, together with such additional information as seemed necessary. A very important feature of this department will be found in the inclusion of many new names, representing those persons in every department of intellectual activity to whom public interest has been of late significantly drawn, and in whom this interest is certain to be enduring.

Scarcely less important and equally in need of constant alteration is the department of *GEOGRAPHY*. Those articles especially that relate to places in the United States and Canada have demanded a thorough and minute revision, owing to the rapid growth of population, the establishment of new industries and public works, and, in many cases, the alteration of local terminology and municipal divisions. Accordingly, a large proportion of these articles have been entirely rewritten with reference to the insertion of these new facts. In nearly every case the information so included has been derived from an official source, and this has been especially true of the statistical material relating to the larger administrative divisions of the two countries. It is believed that this feature of the work is now in a more satisfactory state and more near to the embodiment of a proximate accuracy in detail than is the case with any other standard work of reference. In those articles that relate to foreign countries and to foreign cities, although the need of revision is always far less frequently demanded, they have none the less in their turn been subjected to a searching criticism. The principal results of the German census of 1895, of the French census of 1896, and of the Russian census of

1897 have been at the disposition of the editors, as have also the official estimates relating to the population of the departments and large cities of Italy for 1894 and 1895; while for several of the countries of Central and South America, not only the statistics relating to population but to other matters as well have been accessible, making it in many cases possible to include much information of this sort officially put forth in 1895 and 1896. Under this head the editors and revisers have also had recourse to authoritative sources; and they wish to acknowledge their indebtedness to the diplomatic representatives of the United States abroad and to those of foreign countries accredited to the United States. The consular reports that have from time to time been published by our own Government have furnished very valuable information, and with the aid of these and many other similar publications a large number of the foreign articles have been entirely rewritten.

The rapid development of the **INDUSTRIAL ARTS AND MANUFACTURES** that is so striking a feature of the present day has rendered this department of the *Cyclopædia* one demanding a special scrutiny, which has resulted in the revision of the principal articles on applied science; while new and important titles have of necessity been added in order to supply much interesting information with regard to new inventions and discoveries of a mechanical nature, and their application to industrial uses.

Besides the subjects which fall under the several heads already specified, the scope of the revision has included many other topics which it will be sufficient to specify more generally. An examination has been made of such portions of the work as relate to the most recent **POLITICAL HISTORY**, and to some of the more important topics of **ECONOMICS** and **EDUCATION**, including, under the latter head, the universities, the colleges, and other institutions of higher learning in the United States. In this portion of the revision, as in the others specified, such information as has been added is drawn very largely from local and official sources; and in collecting it the co-operation of the Presidents and Faculties of these institutions has been frequently secured. On the whole, it may be stated with much confidence that the *INTERNATIONAL CYCLOPÆDIA*, by reason of the alterations made in it, is now brought measurably nearer to the standard of an ideal work of reference. The present revision has in its details been carried out under the personal direction of Professor Frank Moore Colby, of New York University, who, with a staff of assistants, has devoted many months to the completion of the task. Such especial merit as the new edition shall be found to possess is to be mainly ascribed to his experience, and to the careful, conscientious, and effective manner in which he has discharged this very onerous duty.

Six years ago, in putting forth the earlier edition, the editors expressed their firm belief that owing to the comprehensiveness of its plan, and to the fact that it embodied the lessons drawn from the experience afforded by other undertakings of a like character, both foreign and American, the *Cyclopædia* would be found worthy to sustain the crucial test that comes from daily reference and use. This confidence may be said to have been fully justified. While the book has of necessity received much criticism in detail, — a thing inevitable in the case of any work so broad in its design, so varied in the range of subjects treated in it, and so comparatively minute in its subdivision of topics for the convenience of the general reader and for ease of reference, — it is not too much to say that, measured by every fair and impartial standard, it has well sustained the claims that have been made for it. No better proof of this could be desired than the striking approbation which has been given it by educators, by scholars, and by those whose professional necessities have led them to consult it systematically and often. It has made its way into all the great libraries of the country, it has been officially adopted by many educational boards as a standard work of reference, and it has received the unsolicited commendation of a great body of disinterested and intelligent readers. It is the feeling of obligation arising from this very generous favor that inspires the publishers and editors alike with the earnest wish to make the work still more deserving of it; and both publishers and editors would be equally remiss did they not, in issuing a new edition, express for this most gratifying evidence of approval their very high appreciation.

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THE INTERNATIONAL CYCLOPÆDIA.

REVISED EDITION.

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- MINTON WARREN.
Johns Hopkins University.
- HON. S. G. BROCK.
Late Chief of the Governmental Bureau of Statis-
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- HON. WILLIAM T. HARRIS.
United States Commissioner of Education.
- EDWARD STABLER.
Actuary of the Manhattan Life Insurance Co., New
York.
- CHARLTON T. LEWIS.
New York City.
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- R. A. GUILD.
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- EDGAR W. NYE ("BILL NYE").*
- P. SAMPERS.
Courrier des États-Unis.
- ALBRECHT WEBER.
Professor of Indian Language and Literature, Uni-
versity of Berlin.
- HON. NOEL A. HUMPHREYS.
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Britain and Ireland.
- W. W. NEWELL.
Editor of the *Journal of American Folk-Lore.*
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Superintendent of Public Documents.
- HON. R. E. PRESTON.
Director of the United States Mint.
- REV. J. F. BURNETT.
Secretary of the American Christian Convention.
- REV. ALEXANDER McLEAN.
Corresponding Secretary of the American Bible
Society.
- GENERAL JAMES GILLISS.
Deputy Quartermaster-General.
- HON. JOSEPH P. SMITH.
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THE INTERNATIONAL CYCLOPÆDIA.

A

A, THE first letter in the English as in almost every known alphabet. This precedence in alphabetic position is probably due to the phonetic character of the sound it represents. An exception to this law of first place, however, is found in the Ethiopic, in which it is the thirteenth letter, and also in the old national Germanic alphabet, the Runic "futhark." Its secondary position in this latter, it has been suggested, with some plausibility, is due, perhaps, to an artificial arrangement of the Runes, in assimilation with the order of the initial letters of the old Teutonic form of the Paternoster.

In form our A, like the rest of our Alphabet, is derived from the Latin, and that in turn from the Greek. The Greek alphabet, with some additions, adaptations, and changes, was formed, as is generally agreed, on the basis of the Phœnician; the Phœnician itself is commonly supposed to have been adopted from symbols in the old hieratic writing of the Egyptians. In the history of its forms, A has undergone a series of changes and developments. The Greeks called the letter *alpha*, whence "alphabet," having borrowed its name and form from the Phœnician. In the latter, as in Hebrew, it was called *aleph*, from some supposed resemblance to the head and horns of an "ox," which the latter word, *aleph*, signifies. This fancied identification, by the Phœnicians, with the ox, is now presumed to be erroneous; there is reason for believing with de Rougé that in the oldest hieroglyphic pictures the form used by the Egyptians to express the sound was that of an eagle; the corruption in the cursive hieratic form may have led to the mistake on the part of the Phœnicians.

Phonetic Character.—In regard to its phonetic character, original *a* may be described as a "mid-back-wide" vowel; it had what we may term the *ah* sound, familiarly known as the "Italian" or "Continental" *a*, heard in *far*, *father*. By nature *a* is a simple and easy vowel, made by opening the throat naturally and expelling the breath with the least modification by the parts of the mouth. Such is the sound that this letter has in most languages; in English, however, it has undergone so many modifications that to-day the pure *ah*-sound is comparatively scarce in our speech, and instead now of calling the letter itself by the name *ah*, as in most Indo-Germanic tongues, we term it "*ay*" (*æ*), as in Tennyson, *The Epic* ad fin. "Mouthing out his hollow *oes* and *æs*." The Anglo-Saxon or Earliest English preserved the genuine old *ah*-sound, though shorter perhaps in quantity than the *a* of *father*. It was of quite frequent occurrence, and by its side existed the corresponding long *a*, often marked with the quantity sign. In Anglo-Saxon, short *a* was subject, however, to certain modifications and shiftings; in its stead *o* was frequently written, as in *hond*, *hand*, *frem*, *fram*; or the *ah*-sound was shifted to *æ*, as in *sat*; A.S., *sæt*; Goth., *sat*. These modifications account only in part for the variety of sounds which the Mod. Eng. *a* represents, as other external influences have come in still more to alter the sound. The orthography has not kept pace with the change in pronunciation; hence the anomalous character of *a* as a sound-symbol. There are some half dozen different sounds, shorter and longer, which *a* may represent in English; some of these sounds are, of course, extremely common; others are comparatively rare. The principal are:

- | | |
|-------------------|--------------------------------|
| (1) <i>fat</i> , | (4) <i>father</i> , |
| (2) <i>fate</i> , | (5) <i>false</i> , |
| (3) <i>fare</i> , | (6) <i>what</i> , <i>was</i> . |

To these is to be added the vowel sound in *ask*, *chance*, *can't*, *past*, which varies with different speakers, and is apparently to be placed somewhere intermediate between *fat*

and *father*. Likewise is to be noted the indifferent sound of *a*, approaching the *u* in *but*, that so frequently occurs in unstressed syllables, like *against*, *abundant*, and also the sporadic *a* in *any*, *many*, where it approaches a short *e*. The rounded vowel above noted in *was*, *false*, and the like, is due to the influence of the adjacent consonant *w*, *l*. The former sound, the *a* in *was*, is almost the short *o* to *all*. In the latter case with *l*, we find also *au* beside *a* to express the sound, as *fault* beside *false*. The commonest short sound of *a* in English, however, is the flat vowel in *hat*; its frequency leads to our calling this the "short *a*," as corresponding "long" we generally assign the vowel in *hate*, although the latter is really the long *e*-sound of *they*. The vowel of *fare*, *bare*, is a still further modification. The percentage of occurrences of the old *ah*-sound in *far*, *father*, is in English extremely small.

Indo-Germanic a.—In the Indo-Germanic languages the vowel row *a*, *i*, *u* is especially prominent; in Sanskrit, and also in Gothic, these are the only short vowels. The short *a* is never written in Sanskrit after consonants, but is regarded as inherent in the sign. Owing to these circumstances it was believed, until within a few years, that the primitive Indo-Germanic speech possessed only *a*, *i*, *u*, and that *a* was the oldest and purest of the vowels; this view has since been much modified; it has been shown that *e* and *o* must have existed beside *a*, *i*, *u* in the primitive speech, and that they are of equal age with the others. As an instance of a genuine Indo-Germanic short *a*, we may take Indg.* *agros*, "field, acre;" Skt., *āgra-s*; Gk., *ἀγρο-ς*; Lat., *ager*; Goth., *akr-s*. As instances of the change of pronunciation in English may be cited A.S. *stand-an* (pron. *stond-an*), "to stand;" Mid. Eng., *stand-en* (pron. *stond-en*); Mod. Eng., *stand*. Again, A.S. and M.E., *mann* (pron. *mōnn*); Mod. Eng., *man* (pron. *mæn*); A.S., *nama* (pron. *ngma*); M.E., *name* (pron. *naame*); Mod. Eng., *name* (pron. *neim*). The corresponding long *ā* occurs commonly in the oldest English, as in the other Indo-Germanic tongues; the history of its development into the modern speech, however, has been somewhat different, as it has passed over chiefly into an *ō*-sound.

As a Symbol.—Standing at the head of the alphabet as *a* does, it is commonly used as a symbol to denote the first in order in a row or series. It is therefore thus employed to denote one of the notes (*la*) in Musical Notation (q.v.); similarly in Logic (q.v.) to denote the universal affirmative. In Algebra (q.v.) the letters *a*, *b*, *c* are used to denote known quantities as opposed to *x*, *y*, *z*, the unknown quantities. In Geometry (q.v.), *A*, *B*, *C* are familiar as a designation for points, angles, etc. In abstract reasonings and suppositions, *A*, *B*, *C* are likewise employed as convenient designations for particular persons and things. In writing and printing, the series *a*, *b*, *c* is commonly used for reference. In nautical matters, A1, A2, A3 is in common use to denote the class and quality of ships. *A* stands also as the first of the Dominical Letters (q.v.).

In Abbreviations, *a* is often found: thus, *a* for "adjective," "active," etc.; *a*, or @, for *at*; A.D. for *anno domini*; A.M., *ante meridiem*; A.B. and A.M. = *artium baccalaureus* and *artium magister*; and among the Romans, A.U.C. for *anno urbis conditæ* or *anno ab urbe condita*. See also ABBREVIATIONS.

In Grammatical Forms.—This same letter in a number of phrases and grammatical forms in English. In some of these it is a mutilated form of a fuller word. The first use to be noted is its employment beside *an* as an indefinite article; both forms, *a*, *an*, are weakened from the A.S., *ān*, "one." In provincial dialects *a* ('*a*') appears as a pronominal form for *he*, etc., as in *quotha*, "quothe he." Sometimes it thus stands for *have*. It appears as a preposition for A.S., *on*, with a verbal noun in certain old phrases, as *a-hunting*, *a-building*; also for A.S. *of* in *Jack-a-lantern*, *John a Gaunt*, Rich. ii. 1.3. Similarly as a prefix for A.S., *on*, in *asleep* (A.S. *on slæpe*), *away* (A.S. *on weg*), for *off* in *adown* (A.S. *of dūne*); again intensive in *a-thirst* (A.S. *of-thirst*). It likewise stands for long *ā* as a verbal prefix *arise* (A.S. *ā-rīsan*), *awake*, and in many other phrases.

A, as a note in music, is the major sixth of the scale of C major. When perfectly in tune to C, it stands in the proportion of $\frac{3}{2}$ of 1. But in this state it would not be a fifth to D, the second note of the scale of C, being a comma too flat, which difference is as 80 to 81. The ear being sensibly offended with this deficiency, the note *A* is therefore made the least degree higher than perfect—namely, $\frac{256}{161}$, by which the advantage is gained, that *A* is a fifth above D ($\frac{102}{101}$), or only deficient in the proportion of $\frac{181}{182}$ —a deficiency so trifling that the ear accepts the fifth, D, *A*, and the sixth, C, *A*, as perfect, although, mathematically calculated, the one is too great and the other too small.—For *A* major and *A* minor, see KEY.

A1, a symbol by which first-class vessels are known in Lloyd's register of British and American shipping (q.v.) and by which the operations of shippers of goods and insurers are governed. Surveyors appointed by the society examine all vessels in course of building, with a view to ascertaining their character, and inscribing them accordingly in the register. *A* designates the character of the hull of the vessel; the figure 1, the efficient state of her anchors, cables, and stores; when these are insufficient, in quantity or quality, the figure 2 is used. The character *A* is assigned to a new ship for a certain number of years, varying from four to fifteen, according to the material and mode of building, but on condition of the vessel being stately surveyed, to see that the efficiency is maintained. A vessel built under a roof is allowed an additional year on that account. An additional period of one year, and, in certain cases, of two years, is also allowed to vessels whose decks, outside planking, etc., are fastened in a specified way. After the

original period has elapsed, the character A may be "*continued*" or "*restored*" for a time (1-8 years), on condition of certain specified repairs.—When a vessel has passed the age for the character A, but is still found fit for conveying perishable goods to all parts of the world, it is registered A in red. (The symbol for this class was formerly Æ asterisk in red.)—Ships Æ in black form the third class, and consist of such as are still found, on survey, fit to carry perishable goods on *shorter voyages*.

AA, the name of a number of rivers and streams in the north of France, Holland, Germany, and Switzerland. As many as forty have been enumerated. The word is said to be of Celtic origin, but it is allied to the old German *aha*, Gothic *ahva*, identical with the Latin *aqua*, "water." Ach or Aach is another form of the same word. Four streams of the name of Ach fall into the lake of Constance. The word, in both forms, occurs as final syllable in many names of places, as Fulda (formerly Fuldaha), Biberach, Biberich, etc. In the plural it is Aachen (waters, springs), which is the German name of Aix-la-Chapelle (q.v.). Aix, the French name of so many places connected with springs, is derived from Latin *Aquæ*, which became in old French *Aigues*, and then Aix. Compare the Celtic Esk, Ex, Axe, Ouse.

AA, CHRISTIAN KAREL HENDRIK, VAN DER, 1718-93; b. at Zwolle, Holland; a celebrated scholar and clergyman, author of works on natural science. His grandson, CHRISTIAN PIETER ROBIDE, 1791-1851, b. Amsterdam, was a poet of considerable prominence. Another of the same family (presumably), JAN, is the author of a *Biographical Dictionary of the Netherlands*.

AACHEN. See AIX-LA-CHAPELLE.

LA'GESEN, SVEND, one of the earliest historians of Denmark, who lived in the latter part of the 12th century. His history of that country covers from the 4th to the 12th centuries, both inclusive.

AALBORG (Eel-town), a seaport in the north of Jutland, with considerable trade; pop., '90, 19,503.

AALLEN, a walled town of Württemberg, on the Kocher, at the foot of the Swabian Alps. In the town are linen and woolen factories, ribbon looms, and tanneries; and near by are extensive iron works. A. was a free city from 1360 to 1863, and then annexed to Württemberg. Pop. about 7000.

AALI PASHA', 1815-71; d. Constantinople. In 1834 he was secretary of legation to Austria; in 1838 in the British legation, and for a time *chargé des affaires*. In 1840 he was under-secretary for foreign affairs; 1841 to 1844, ambassador to England; subsequently member of the Turkish council of state and justice, minister for foreign affairs, and imperial chancellor. He was in the foreign office from 1846 till 1852; then promoted to be field marshal and pasha. About the close of 1852, he was, for a time, grand vizier or prime minister, which position he resigned, and was made governor-general of Smyrna, and afterwards of Brusa. In 1854 he was restored to power as foreign minister; in 1855 he attended the council at Vienna, and was once more made prime minister. He resigned Nov. 1, 1856, but the sultan kept him in the cabinet without official position. In 1858 he was again grand vizier, retired the next year, but returned again. In 1861 the sultan made him once more the head of the cabinet, but in the same year he resigned and accepted the portfolio of foreign affairs. In June, 1867, he was appointed regent of the empire during the sultan's visit to European courts. He bore a prominent part in the London conference of 1870, to settle upon Russia's questions concerning the opening of the Black Sea.

AALST. See ALOST.

AALTEN, a t. in the Netherlands, on the Aar, 29 m. e. of Arnheim; pop. about 7000.

AAR, next to the Rhine and Rhone, the largest river in Switzerland, rises in the glaciers near the Grimsel in Berne, forms the falls of Handeck, 200 ft. high, flows through lakes Brienz and Thun, and passing the towns of Interlaken, Thun, Berne, Solothurn, Aarau, Brugg, and Kilgenau, joins the Rhine at the village of Coblenz, in Aargau, after a course of nearly 200 miles. It is a beautiful crystal stream, and, though rapid, is navigable for small-craft from lake Thun. There are several small rivers of the same name in Germany.

AARAU, chief t. in the canton of Aargau, Switzerland, near the Jura mountains, on the right bank of the Aar, 41 m. n.e. from Berne. It is well built; has a town hall, barracks, several small museums, and a library rich in Swiss historical works. There are silk, cotton, leather, and cutlery manufactories, and an iron foundry. The town is famous for producing excellent mathematical instruments. The slopes of the mountains are covered with vines, and the vicinity is very attractive. Pop., about 6800.

AARD-VARK, *Orycteropus capensis*, the Earth-pig; a plantigrade animal, class mammalia, order edentata; native and common in South Africa; resembling a short-legged pig; length, full grown, about 3 ft. 5 in.; head 11 in.; tail 1 ft. 9 in.; ears 6 in. It has a long, thin head, the upper jaw projecting over the lower; mouth small; tongue long, slender, flat, and covered with glutinous saliva to entangle ants. The ears erect and pointed; eyes far up the snout; body thick and fat; limbs short and very strong. The skin is usually bare, but sometimes partially covered with stiff, reddish-brown hair; the tail is bare, thick at the base and sharp at the end. It is very timid, and hastens to burrow in the ground upon the least alarm. It feeds entirely on ants, going at dark

to their hills and running its long tongue into a passage-way; the frightened ants are stuck in the saliva and devoured. The flesh is tolerable for food, and the hind quarters are sometimes smoked or salted and eaten. See *illus.*, **MARSUPIALIA**, vol. IX.

AARD-WOLF, *Proteles Lalandii viverra cristata*, the Earth-wolf; a quadruped of the digitigrade carnivorous mammalia; native of South Africa; looks like a cross between the fox and hyena, and is about the size of a full-grown fox, but standing higher on its legs; ears larger and less hairy, tail not so bushy. It is striped, and might be mistaken for the hyena, from which it differs chiefly in a more pointed head, and a fifth toe on the fore foot. Its fur is ash-colored and woolly, and it has a coarse mane from head to tail, which is elevated when the animal is enraged, like the hair on a cat's back. Its muzzle is black and nearly naked; legs and feet dark brown in front and gray behind; ears dark brown outside and gray inside. It goes abroad only in the night, and then for food. It is fond of its kind, and a number will live in a single burrow.

AARGAU (ARGOVIE), a canton of Switzerland, on the lower course of the Aar, and having the Rhine for its n. boundary. Its surface is diversified with hills and valleys, is well wooded, and generally fertile. The area is about 540 sq.m., and the population in 1890 was 193,580, rather more than half being Protestants. Besides agriculture, considerable manufacturing industry in cotton and silk is carried on both in the towns and country, and the prosperity of the population has of late markedly increased. In this canton is the castle of Habsburg or Hapsburg, the original seat of the imperial family of Austria. The chief town is Aarau.

AAR/HUUS, a seaport on the e. coast of Jutland, and seat of a bishop; pop., '90, 33,308.

AARIFI PASHA', a Turkish statesman. He held successively many important offices, among them those of minister of foreign affairs, ambassador to France, and Grand Vizir. He was a fine linguist, familiar with French, Turkish, Persian, and Arabic, and has won a place in literature by translating *The History of the Crusades* from the French. He was president of the council of state at the time of his death in 1896.

AARON, the elder brother of Moses, was appointed his assistant and spokesman, and at the giving of the Mosaic law received for himself and his descendants the hereditary dignity of the priesthood. Aaron assisted his brother in the administration of public affairs. He died in the 123d year of his age, on mount Hor, on the borders of Idumea. His third son, Eleazar, succeeded him in the office of high-priest.

AARSENS, FRANCIS VAN, 1572-1641; one of the greatest diplomatists of the United Provinces. He represented the States General at the French court many years, and was in diplomatic service in Venice, Germany, and England. Richelieu, with whom he had negotiations in 1624, ranked him as one of the three greatest politicians of the time. There is a stain on his memory because of his complicity in the death of Barneveldt, who was executed in 1619, by order of the States General, after a trial which was scarcely more than a mockery.

AASEN, IVAN ANDREAS, b. 1813; a Norwegian philologist. He was the son of a farmer; educated by his own exertions; studied botany, but turned his attention to the native dialects. In 1848 he published *Det norske Folkesprogs Grammatik*, and in 1850 added *Ordbog over det norske Folkesprog*, enlarged under the title of *Norsk Ordbog* in 1873, and still later a work on Norwegian proverbs. He was granted an annuity some years ago.

AASVÄR, islands off Norway, about lat. 66°, an important centre of herring fishery, in which more than 10,000 men are employed in December and January; but for the rest of the year the islands are almost deserted. The fish is the great Nordland herring, and the catch often reaches 200,000 tons in a season.

AB, the fifth month of the ancient Jewish year, now the eleventh (and in intercalary years the twelfth), in consequence of the transfer of new year from spring to autumn. On the first day of Ab there is a fast to commemorate the death of Aaron, and on the ninth the most solemn of all Hebrew fasts, to mark the destruction of the first temple by Nebuchadnezzar, 588 B.C., and the second temple by Titus, 70 A.D. Ab may begin as early as July 10, or as late as August 7.

ABAB'DE, ABABDEH, or ABABDIE, an African people occupying the region between the Nile and the Red Sea, south of Kossier, and near the latitude of Dera, or Derr. They are distinct from Arabs, though they intermarry, and accept the religion of the Koran. As a rule they are faithless and treacherous. They have few horses, but fine breeds of camels and dromedaries. There are three tribes, numbering in all about 120,000. Some are agriculturists, but the great part are nomadic. They have considerable possessions, and a small trade in senna and charcoal, which they send to Cairo.

AB'ACA, or MANILA HEMP, is the fibre of a species of plantain or banana, *Musa troglodytarum*, a native of the Philippine isles, where it is extensively cultivated. The leaf-stalks are split into long strips and the fibrous part is then separated from the fleshy pulp. A laborer can in this way produce daily 50 lbs. of hemp. Before 1825, the quantity produced was insignificant, but now it amounts to nearly 31,000 tons annually. In Manila there is a steam rope-work for making ropes of it for naval purposes. They are very durable, but not very flexible. The fibre of a number of species of *Musa* is used in tropical countries. See **PLANTAIN**.

ABACOT, a word corrupted from *bycocket*, and said to mean a "cap of state wrought up into the shape of two crowns, worn formerly by English kings." The true word, *bycocket*, frequently found up to 1500 and later, after undergoing many corruptions appears in Spelman's Glossarium (1664) as "Abacot," with the above definition. The original meaning probably survives in the Sp. *bicoquin*, a cap with two points. Henry V. wore a crown upon his bassinet at Agincourt, and Richard at Bosworth wore his crown upon his helmet; so Henry VI. (crowned king of England and France) wore at Hedgley Moor two crowns upon his bycocket, but in no sense as part of it.

AB'ACO, or **LUCA'YA**, the largest of the Bahama islands, 80 m. long by about 15 m. wide, 150 m. e. of Florida, lat. 25° 51' N., long. 77° 5' W. Pop. 2000. Ship-building, wrecking, and turtle-fishing are the chief employments.

AB'ACUS, a calculating machine or table occasionally employed in modern primary schools to make the elementary operations of arithmetic palpable. It consists of a frame with a number of parallel wires, on which beads or counters are strung. In ancient times, it was used in practical reckoning, and is so still in China, Persia, and elsewhere. — *Abacus Pythagoricus* meant the multiplication-table. — **ABACUS**, in arch., is a square or oblong level tablet on the capital of a column, and supporting the entablature. In the Doric, old Ionic, and Tuscan orders, the abacus is a regular oblong; but in the new Ionic, Corinthian, and Roman orders, the abacus has concave sides, with truncated angles. Square marble tablets let into walls, and fields with figures in them inserted in mosaic floors, were also included under the term abacus in ancient architecture.

ABAD' (allied both in etymology and meaning to the Eng. *abode*), an affix to names of Persian origin, as *Hyderabad*, the "dwelling" or city of Hyder.

ABAD' I. (**ABU AMRU IBN HABED**), the first Moorish king of Seville, and founder of the Abadite dynasty. His ancestors were from Syria, but he was born near the Guadalquivir, and brought up in Seville, where by generosity and hospitality he became so popular that the people, in 1015, elected him king. He ruled 26 years, and added Cordova to his dominions.

ABAD' II. (**MOHAMMED IBN HABED**), 1012–69; son of A. I. He enlarged his father's dominions by adding Andalusia. He is said to have been cruel and relentless.

ABAD' III. (**MOHAMMED IBN HABED**), 1039–95; son of A. II., a lover and patron of letters and writer of poetry. He was tolerant and kind, and peaceably added a part of Portugal to his kingdom. His chief opponent, Alfonso VI. of Castile, married A.'s daughter, and the alliance roused the jealousy of the smaller Moorish princes, who engaged the king of Morocco in a league by which A. and Alfonso were defeated. Seville was spared from sack by a A.'s prompt surrender. He was kept four years a prisoner in Morocco, and his daughters were compelled to spin wool for subsistence. A.'s verses, written while in captivity, are admired. He was the last of the Abadites.

ABAD'DON. See **APOLLYON**.

ABÁFT (lit., *by aft*). Nautical term, meaning *behind, toward the stern*, e.g., "abaft the mainmast," equivalent to *behind the mainmast, toward the stern of the vessel*.

ABA'KA KHAN d. 1280; the second Mongol king of Persia, of the family of Genghis Khan. He completed the conquests begun by his father, and consolidated the Mongol rule over western Asia.

AB'ANA and **PHARPAR**, "rivers of Damascus" (II. Kings v. 12); probably the present Barada and Awaj, the former flowing through Damascus, and the other passing 8 m. to the south. Both rivers are lost in the marshes on the border of the Arabian desert. The plain of Damascus owes much of its fertility to the irrigation of these rivers.

ABANCAY', a. t. in Peru, 65 m. w.s.w. of Cuzco, on the Abancay, over which is one of the finest bridges in South America. The town has extensive sugar refineries; sugar and hemp are cultivated, and silver is found in the mountains.

ABANCOURT, **CHARLES XAVIER JOSEPH D'**, 1758–92, a French statesman. When the revolution of 1789 broke out he was captain of cavalry, but Louis XVI. made him minister of war. In 1792 he was imprisoned by the revolutionary tribunal as a foe to freedom; but while on the way from Orleans to Paris the transport was mobbed and he and his fellow-prisoners were butchered.

ABANDON, **ABANDONING**, **ABANDONMENT**. This term, in its different grammatical and etymological forms, has various applications in legal phraseology, but all more or less corresponding to its popular meaning. The following are examples:

ABANDONING AN ACTION is a technical expression in Scotch legal procedure, signifying the act by which a plaintiff—or "pursuer," as he is called in Scotland—abandons or withdraws from his action on the payment of the costs incurred, and with the approval of the judge before whom the action had previously been conducted. The same purpose is effected in the U. S. by the plaintiff in a court of common law either entering *a nolle prosequi*, or at the trial *withdrawing the record*. In the courts of equity, the plaintiff may move the *dismissal* of his own bill, or the defendant may move to dismiss the suit for *want of prosecution by the plaintiff*. Suits may also *abate* by the death or supervening incapacity of the parties. — See **ACTION**.

ABANDONMENT, in marine insurance, signifies the relinquishment to the insurer or

underwriter of goods or property saved from a shipwreck, and of all interest in the same, previous to the owners' demanding payment in terms of the policy. See **INSURANCE**.

ABANDONMENT of a wife by her husband is synonymous with *desertion*. See **HUSBAND AND WIFE**.

ABANDONING or deserting seamen, by masters of merchant-vessels, is a misdemeanor and punishable by imprisonment. See **SEAMEN**.

ABANO, PIETRO D', an Italian philosopher, 1250-1316; educated in Constantinople and Paris; professor of medicine in Padua; wrote on philosophy and medicine, and, like other learned men of his time, practised astrology, by reason of which he was accused of magic, and sentenced to be burned; but he died in prison.

ABAR'BANEL. See **ABRAVANEL**.

ABARCA, JOAQUIN, a Spanish bishop, b. about 1780, d. 1844. For supporting the absolute rule of Ferdinand VII. he was made bishop of Leon; but he went with Don Carlos to Portugal and England, acting as his agent, though finally losing the pretender's regard. Banished from Spain, he sought a monastery at Lanzi, where he died.

AB'ARIM, a range of mountains in the land of Moab, e. of the Jordan and facing Jericho. The highest point was Mt. Nebo, the place where Moses closed his earthly career.

AB'ARIS, a Scythian priest of Apollo, to whom it was fabled the god gave a golden arrow on which to ride through the air. This dart rendered him invisible, and it cured diseases and gave oracles. A. gave the arrow to Pythagoras.

ABASCAL, JOSÉ FERNANDO, 1743-1821; a Spanish statesman and general; entered the army in 1762; governor of Cuba in 1796; viceroy of Peru from 1806 to 1816; in the year 1816 made a marquis, and afterwards captain-general of Spain. He was noted for administrative ability, firmness, and moderation.

ABATEMENT. This is a term used in various senses in the law of the United States, as follows: 1. *Abatement of Freehold*, where a stranger without right enters and gets possession. See **FREEHOLD**. 2. *Abatement of Nuisances*, which is a remedy against injury by nuisance. See **NUISANCE**. 3. *Plea in Abatement*, by means of which a defendant, on some formal and technical ground, seeks to abate or quash the action. See **ACTION**. 4. *Abatement of Legacies and Debts*, where the estate is insufficient for payment in full. See **LEGACY**. 5. *Abatement* by the death of parties to actions at law and suits in equity, which are in consequence stopped till revived. The marriage of a plaintiff, the change or loss of interest and right, and other similar considerations, have also the effect of abating legal proceedings. See **ACTION**. 6. *Abatement* or discount in commercial law. See **MERCANTILE LAW**. 7. *Abatement* or deduction of duties levied by the custom-house. See **CUSTOMS DUTIES**; **DRAWBACK**.

ABATEMENT, in Heraldry, is a mark placed over a portion of the paternal coat-of-arms of a family, significative of some base or ungentleman-like act on the part of the bearer. The coat is then said to be abated, or lowered in dignity. Guillim gives nine such marks, all of which are of either one or the other of the two disgraceful colors, tanné (tawney) and sanguine. Such are the delf tanné, assigned to him who revokes his challenge; the escutcheon reversed sanguine, proper to him who offends the chastity of virgin, wife, or widow, or flies from his sovereign's banner; the point-dexter tanné, due to him who overmuch boasteth himself of his martial acts; and the like. Marks of abatement are generally repudiated by the best heraldic authorities. Menestrier calls them *sottises anglaises*, and Montagu is of opinion that we shall seek in vain for a more appropriate designation. Abatements are carefully to be distinguished from such subtractive alterations in coats-of-arms as signify juniority of birth, or removal from the principal house or senior branch of the family. These are commonly called marks of cadency, distinctions, differences, or brisures. The latter term is generally applied to marks of bastardy, which might with less impropriety be classed with abatements.

ABATI, or DELL' ABATO, Bocco, member of a Florentine family, achieved ignoble distinction by an act of treachery, and was doomed to eternal contempt by Dante, who represents him in his *Inferno* (canto xxxii.), as consigned to the lowest circle of hell. During a battle between the Guelphs and Ghibellines in 1260, Jacopo del Vacca carried the Florentine standard, until his hand was severed from its wrist by a stroke of Abati's sword. With the fall of their standard, the Florentines lost heart, and Abati had the base satisfaction of enabling the enemies of his city to conquer.

ABATI, or DELL' ABBATO, NICCOLO, 1512-71; a fresco-painter of Modena. He assisted Primaticcio in decorating the palace of Fontainebleau. A.'s work has been highly praised by Lanzi, Algarotti, and others. One of his finest pieces in oil is the "Martyrdom of St. Peter and St. Paul," now in the Dresden gallery.

ABATTIS, a species of intrenchment, and one of the oldest. It consists of trees felled (*abattu*), and laid side by side, with the branches directed towards the enemy, the softer twigs being cut off. It thus forms a breastwork to fire over, and is very useful in field-works and in the outworks of regular fortifications, for retarding the enemy's advance. See *illus.*, **FORTIFICATIONS**, vol. VI.

ABATTOIR (Fr. *abattre*, to fell or destroy), a slaughter-house. The use of this term has passed into England from France, where the example was first given of public establishments for the slaughter of animals used as food, on such a scale and with such sanitary arrangements as to obviate the injurious effects that are found to result from the existence of private slaughter-houses in the midst of a crowded population. This great public improvement originated with Napoleon, who passed a decree in 1807 for the erection of public *abattoirs*. The extensive works connected with this design were nearly completed before the fall of the Empire; but it was not till the close of 1818 that the Parisian butchers ceased to slaughter in their private establishments. There are now a number of these *abattoirs* in Paris—several of them situated on the banks of the Seine, containing over 240 slaughter-houses—which, both in architectural propriety and completeness of internal arrangement, may be regarded as models of their kind. The charge per head is, for an ox six fr. a cow 4 fr., a calf 2 fr., and a sheep 50 centimes. Of the appearance and management of one of the great Parisian *abattoirs*, a good account is given by Sir Francis Head in his amusing work, *A Faggot of French Sticks*. Other towns in France have similar *abattoirs*; and so have Mantua and Brussels.

In the United States, the government, of course, has no control over *abattoirs* or slaughter-houses, as they are generally called. Those of Chicago, Kansas City, Kansas, St. Louis, Milwaukee, Cincinnati, Louisville, Indianapolis, and Buffalo are celebrated for the great extent of their buildings, the improved machinery and appliances used, the marvelous rapidity with which the work is performed, and the enormous annual output. At Kansas City upward of 10,000 hogs and 1000 cattle can be daily disposed of. In the article on the city of Chicago the reader will find similar statistics.

ABATTUTA (Ital.), in music, in strict or measured time.

ABAUZIT, FIRMIN, a French savant, was born at Uzès, in Languedoc, 1679, and died at Geneva 1767. His parents were Protestant, and at the revocation of the Edict of Nantes, being only six years of age, he escaped with difficulty, by his mother's contrivance, from the hands of the authorities, who wished to educate him into Catholicism, and was sent to Geneva. Here he prosecuted his studies with such intense ardor and diligence, that he became versed in almost all the sciences. He travelled in England and Holland in 1698, where he made the acquaintance of Newton, Bayle, and other eminent writers. Newton, in sending him one of his controversial works, paid him the distinguished compliment of saying: "You are worthy to decide between Leibnitz and me." King William wished to retain him permanently in England, and to that end made him several advantageous offers; but his affection for his mother induced him to return to Geneva. He translated the New Testament into French in 1726, and for his lucid investigations into the ancient history of Geneva he received from its authorities the rights of citizenship. He likewise wrote numerous theological and archæological treatises, besides leaving one or two scientific and artistic dissertations in manuscript, but the greater portion of these were burned by his heirs, who were Catholics. His orthodoxy has been disputed. From some of his works we gain the impression that he was a Unitarian. His personal qualities secured him universal esteem. Rousseau, who could not bear to praise a contemporary, penned his solitary panegyric on A.

ABBA (Gr., Ἀββᾶ), is a Chaldaic form of the Hebrew word for father, and appears to have had originally the same signification as our *papa* (πάππα). Later it was employed in speaking of the Deity, and in the New Testament (Mark xiv. 36; Rom. viii. 15; Gal. iv. 6), its meaning is added, for the benefit of readers unfamiliar with Hebrew. The title *Abba* is given to the bishops of the Syriac, Coptic, and Ethiopic churches, and by the bishops to the bishop of Alexandria. See BISHOP; PAPA.

ABBADIE, ANTOINE and ARNAUD-MICHEL D', two brothers, French travelers, known for their researches in Abyssinia, from 1837 to 1845. According to their own account, their objects were purely ethnological and geographical; but they were regarded by certain English travelers and missionaries as agents employed by the French government for religious and political purposes; amongst the results of their travels are a catalogue of Ethiopian MSS., an Ethiopian version of the *Pastor of Hermas*, and the now completed *Géodésie de l'Éthiopie*. The English expedition to Abyssinia led Arnaud d'A. to publish, in 1868, his *Douze Ans dans la Haute-Éthiopie*. Antoine published *Dictionnaire de la Langue Amarinnia* in 1881. He died in 1897.

ABBADIE, JACQUES, D.D., 1658 (?)–1727; a French Protestant divine; b. Nay, near Pau, d., London. Of poor descent, he was educated by his friends, and advanced so rapidly that at 17 he was granted the degree of doctor of theology. He spent several years in Berlin as minister of the French Protestant church, and in 1688 accompanied Marshal Schomberg to England, becoming minister of the French church in London. He was strongly attached to the cause of William III., who made him dean of Killaloe. He wrote a defense of the English revolution.

ABBANDONAMENTÉ (Ital.), in music, with self-abandonment; despondingly.

ABBAS, the uncle of Mohammed, the Arabian prophet, and the chief promoter of his religion (d. 652), was the founder of the family of the **ABBASIDES**, who ruled as caliphs of Bagdad from 749 to 1258, and afterwards exercised the spiritual functions of the caliphate in Egypt, under the protection of mamelukes, till 1517, when that dignity passed to the Turkish sultan. Descendants of this family still live in Turkey and India.—The **ABBASIDES** in Persia were descended from the race of the Sofi, who ascribed their origin to the caliph Ali. This race acquired dominion in 1500, and became extinct in

1736. Among them, Abbas I., surnamed the great, was the most eminent ruler. He came to the throne 1585, and died 1628. His reign was marked by a series of victories over the Turks. In alliance with England, he destroyed, in 1621, the Portuguese colony at Ormuz.

ABBAS I., a renowned monarch of Persia, was the youngest son of shah Mohammed Khodahendah. He made a successful rebellion against his father; caused one or more of his brothers to be murdered, and took possession of the throne when but 18 years old, in 1585. He went against the predatory Uzbeks, who plundered Khorassan, defeating them in 1595 in a great battle near Herat, and driving them out of his domains. He was in almost continuous war with the Turks, over whom he gained many important successes, adding territory to his dominions. By a victory at Bassorah, in 1605, he extended his empire beyond the Euphrates, and Achmed I. was forced to cede Shirwah and Kurdistan. In 1618 he defeated the combined forces of the Turks and Tartars near Sultaine, and made an advantageous peace. But the Turks soon renewed the war, whereupon, in 1623, Abbas took Bagdad after a year's siege. When he died, in 1628, his empire extended from the Tigris to the Indus. He distinguished himself not only by the successes of his arms and the magnificence of his court, but by many administrative reforms, especially encouraging commerce, to facilitate which he built important highways and bridges. He was tolerant to foreigners, especially Christians, though to his own family he was cruel, causing his eldest son to be killed, and the eyes of his other children to be put out.

ABBASIDES, THE, Caliphs of Bagdad, and the most famous of all the Saracen rulers. They claim to have descended from Abbas, the uncle and adviser of the prophet (566-652 A.D.); and they succeeded the Ommiads, who were caliphs of Damascus. The family of Abbas acquired great influence because of their near relationship to the prophet, and Ibrahim, fourth in descent from Abbas, gained several successes over the Ommiad armies, but was captured and executed in 747 by Caliph Merwan. Ibrahim's brother, Abul-Abbas, whom he had named as his successor, assumed the title of caliph, and by a decisive victory near the river Zab, in 750, entirely overthrew the Ommiad dynasty; Merwan was executed, and the house of Abbas was firmly established in the government, though the Spanish possessions were lost by the establishment of the independent caliphate of Cordova. Almanson succeeded Abul-Abbas, and founded Bagdad as the seat of the empire. He fought with success against the Turks and Greeks of Asia Minor; but from this period the rule of the Abbasides was distinguished by the development of liberal arts rather than the extension of territory. The severity of Mohammed's religion was relaxed and the faithful yielded to the seductions of luxury. The caliphs Haroun Al-Raschid, 786-809, and Al-Mamun, 813-833, attained world-wide celebrity for gorgeous palaces, vast treasures, and brilliant equipage, in which their splendor contrasted strikingly with the poverty of European sovereigns. Haroun is well known as a hero of the Arabian Nights, and Al-Mamun as a patron of literature and science. But with all their splendor the caliphs were tyrants, and their memory is stained with deeds of blood wrought through jealousy or revenge. Within less than a century the domains of the Abbasides suffered dismemberment, and their power rapidly decreased. Rival sovereignties (the Ashlabites, Edristes, etc.) arose in Africa, and an independent government was instituted in Khorasan in 820, under the Taherites. In the west the Greeks again began to encroach; but the fatal blow came from a despised and almost savage race. The caliphs had long been waging war against the Tartars of Turkestan, and many captives taken in these wars were dispersed over the empire. Attracted by the bravery of these prisoners, and fearing rebellion among the subjects, Motassem (833-842), the founder of Samarah and successful opponent of the Greeks under Theophilus, formed bodyguards of the Turkoman prisoners, who speedily became the real rulers of the Saracen empire. Mota-Wakkel, son of Motassem, was assassinated by them in 861, and the succeeding caliphs were only puppets in their hands. The caliph Radhi, 934-941, was compelled to delegate to Mohammed ben Rayek, under the title of "commander of commanders," the government of the army and other important functions of the caliphate. Province after province proclaimed independence; the rule of the caliphs was narrowed to Bagdad and vicinity, and the house of Abbas lost its power in the east forever when Hulague, prince of the Mongols, set Bagdad on fire, and slew the reigning caliph, Motassem, Feb. 20, 1258. The Abbasides continued to hold the semblance of power in the nominal caliphate of Egypt, and feebly attempted to recover their ancient seat. The last of the A., Mota-Wakkel III., was taken by sultan Selim I., conqueror of Egypt, to Constantinople, and kept there some time as a prisoner. He returned to Egypt, and died in Cairo, in 1538, a pensioner of the Ottoman government, and the last of the Abbasides.

ABBAS-MIRZA, a Persian prince, well known by his wars against Russia, was the son of the shah Feth-Ali, and was born in 1783. Abbas possessed great talents and acquisitions, and a love for the manners and culture of the west. When he was yet young, his father made him governor of the province Azerbaijan, where, by the help of English officers, he applied himself to the reform of the army. When Persia, in 1811, influenced by France, declared war against Russia, Abbas was commander-in-chief of the main body of the Persian army, but was unsuccessful. Persia lost, at the peace of Gulistan,

in 1813, its remaining possessions in the Caucasus, and was forced to acknowledge the flag of Russia on the Caspian sea. At the instigation of Abbas, a new war broke out in 1826, between Feth-Ali and Russia. The prince fought a second time with extraordinary bravery at the head of the army, but was again obliged to yield to the superiority of the Russian arms, and to conclude a peace, on Feb. 22, 1828, at Turkmantschai, by which Persia lost all share in Armenia. In this treaty, Russia had guaranteed to Abbas the succession to the Persian throne, the consequence of which was that he became dependent on Russia, and was obliged to give up his connection with England. When, in 1829, the Russian ambassador at Teheran was murdered in a popular tumult, which he had provoked by imprudence, Abbas went in person to St. Petersburg, to prevent any ill consequences, and to maintain the peace. He was received by the emperor with kindness, and went back to Persia loaded with presents. He died in 1833. His death was a great loss to his country, although he could not have prevented the encroachments of Russia. His eldest son, Mohammed Mirza, mounted the throne in 1834.

ABBAS PASHA', 1813-54; grandson of Mehemet Ali, and viceroy of Egypt; active but not distinguished in Mehemet's wars in Syria. After Ibrahim's short reign, he took the throne (in 1848) as hereditary successor, but was a cruel and capricious ruler. He dismissed the Europeans in state service, and frustrated much of Mehemet's good work; but he successfully resisted Turkish attempts to lower the condition and prestige of Egypt, and assisted the Sultan in the Crimean war. It is supposed that he was murdered. Abbas Pasha is also the name of the Khedive of Egypt, who was installed in 1892.

ABBATE, NICCOLO DELL, or NICCOLO ABATI, was born at Modena in 1509 or 1512, and died at Paris in 1571. He was an able and skilful artist in fresco-painting, and was a follower both of Raphael and Correggio; yet he rather blent the two styles in one than imitated either separately. His influence is traceable in the art which prevailed during the second half of the 16th century. His earlier works are to be seen at Modena; his later ones at Bologna, among which is his "Adoration of the Shepherds," considered his finest; but he is best known by the frescoes which he executed for the castle of Fontainebleau, from the designs of Primaticcio.

ABBATUC'CI, JACQUES PIERRE, 1726-1812; b. in Corsica; a rival and political opponent of Paoli; but he submitted to his control in the war with the Genoese. He became general in the royal army, but after the capture of Toulon resigned and went to France, where he was promoted to general of division. When the English fleet left Corsica, in 1796, he returned home.

ABBATUC'CI, JACQUES PIERRE CHARLES, 1791-1857; nephew of Charles; law officer under the restoration. After the revolution of 1830, he was made presiding judge at Orleans, and sent thence to the Chamber of Deputies. He was a leader of opposition to Guizot's ministry, and conspicuous at reform banquets. In the National Assembly in 1848, he was a vigorous opponent of the social democratic movement. He became a warm supporter of Napoleon III., who made him minister of justice and keeper of the seals. His sons, Charles, Antoine Dominique, and Séverin, were supporters of the Bonapartes.

ABBÉ, the French name for an abbot (q.v.), but often used in the general sense of a priest or clergyman. By a concordat between pope Leo X. and Francis I. (1516), the French king had the right to nominate upwards of 200 *abbés commendataires*, who, without having any duty to perform, drew a considerable proportion of the revenues of the convents. The hope of obtaining one of those sinecures led multitudes of young men, many of them of noble birth, to enter the clerical career, who, however, seldom went further than taking the inferior orders (see **ORDERS, HOLY**); and it became customary to call all such aspirants *abbés*—jocularly, *abbés* of St. Hope. They formed a considerable and influential class in society; and an *abbé*, distinguished by a short black or violet-colored frock, and a peculiar style of wearing the hair, was found as friend or ghostly adviser in almost every family of consequence. When a candidate obtained an abbey, he was enjoined to take holy orders; but many procured dispensation, and continued to draw the revenues as secular or lay abbots.

ABBE, CLEVELAND, b. New York, 1838; astronomer and meteorologist; in 1868 became director of the Cincinnati observatory. The system which he inaugurated here of weather forecasts, based upon daily meteorological reports by telegraph, attracted the attention of the government, and led to the establishment of a similar system at Washington, whither A. was called to prepare the weather predictions, 1871, July 1. He has contributed to periodicals and cyclopedias, and is the author of a number of works on meteorology. To him is due the introduction of the present system of standard time.

ABBESS, the superior of a religious community of women, corresponding in rank and authority to an abbot (q.v.), except in not being allowed to exercise the spiritual functions of the priesthood—such as preaching, confession, etc.

ABBETT, LEON, b. Philadelphia, 1838; admitted to the bar in that city, 1857; in the same year moved to New York. In 1867 he took up his residence in N. J., was corporation counsel of Hoboken, served in the state assembly and senate, in 1883 was elected governor, and was re-elected in 1889. In 1893, he was appointed to the state judiciary; and died in 1894.

ABBEVILLE, a co. in South Carolina, between the Saluda and the Savannah rivers Area, 1006 sq. m.; pop. '90, 46,854. Co. seat, Abbeville.

ABBEVILLE, a fortified t. of France, in the dep. of Somme, stands on the river Somme, about 12 m. from its mouth, and 90 m. n. by w. of Paris. It is built partly on an island, and partly on the banks of the river; the streets are narrow and ill paved, and the houses built mostly of brick and wood. The building most worthy of notice is the church of St. Wolfran, commenced in the reign of Louis XII., whose façade is a splendid example of the flamboyant style, being pierced by three deep portals, and surmounted by three high gothic towers. The chief manufactures of A. are velvets, serges, cottons, linens, sacking, hosiery, jewelry, soap, glass-wares, glue, paper, etc. It is a station on the Railway du Nord, and is connected by canals with Amiens, Paris, Lille, and Belgium. Vessels of between 150 and 200 tons can sail up the Somme as far as Abbeville. Pop. 20,000.

ABBEY. See MONASTERY, SANCTUARY.

ABBEY, EDWIN A., artist, b. Philadelphia, 1852; studied at the Pennsylvania Academy of Fine Arts. He early began to execute book and magazine illustrations for publishers, and has contributed to all the leading periodicals. His series of illustrations of Herrick's *Poems*, which had originally appeared in *Harper's Magazine*, were collected in book-form, 1882. He has also painted in water-colors. One of his most striking pieces of work is a series of paintings illustrating the Quest of the Holy Grail on the walls of the delivery room of the new public library in Boston. Since 1878 he has resided in Europe.

ABBEY, HENRY E., theatrical manager, was born in Akron, Ohio, in 1848; and spent his boyhood as a clerk in a jewelry house. At the age of twenty-two he began his theatrical career by becoming advance agent for Edwin Adams. In 1871 he leased the Akron Opera House, but not succeeding, abandoned the project, and became a clerk in the box office of the Euclid Avenue Opera House, Cleveland. He then became treasurer of Ellsler's Opera House in Pittsburg, and from there set out on a bolder professional career. His first effort was as manager for Lawrence Barrett, in which a signal success attended him. This venture was followed by the engagement for Lotta. After various fluctuations in his fortunes, he took the Park Theatre in New York, and formed one of the best comedy companies in the country. He acted as manager for Sara Bernhardt, Patti, Neilson, Mrs. Langtry, and Henry Irving, with remarkable success in every case. He was for some time manager of Booth's Theatre and the Grand Opera House in New York, at the same time running the Park Theatre in Boston and the Lyceum Theatre in London. He d. in New York city, Oct. 17, 1896.

ABBOT ("father"). This name, originally given to any aged monk, was afterwards more strictly applied to the superior of a monastery or abbey. Since the 6th c., abbots have belonged to the clerical orders, but at first they were not necessarily priests. After the second Nicene council (787), abbots were empowered to consecrate monks for the lower sacred orders; but they remained in subordination under their diocesan bishops until the 11th c. As abbeys became wealthy, abbots increased in power and influence; many received episcopal titles; and all were ranked as prelates of the church next to the bishops, and had the right of voting in church-councils. Even abbesses contended for the same honors and privileges, but without success. In the 8th and 9th c., abbeys began to come into the hands of laymen, as rewards for military service. In the 10th c. many of the chief abbeys in Christendom were under lay-abbots (*abbates milites*, or *abba-comites*), while subordinate deans or priors had the spiritual oversight. The members of the royal household received grants of abbeys as their maintenance, and the king kept the richest for himself. Thus, Hugo Capet of France was lay-abbot of St. Denis, near Paris. Sometimes convents of nuns were granted to men, and monasteries to women of rank. These abuses were, in a great measure, reformed during the 10th c. After the reformation of the order of Benedictines, monasteries arose that were dependent upon the mother-monastery of Clugny and without abbots, being presided over by *priors* or *pro-abbates*. Of the orders founded after the 11th c., only some named the superiors of their convents abbots; most, from humility or other cause, used the titles of prior, major, guardian, rector. Abbesses have almost always remained under the jurisdiction of their diocesan bishop; but the abbots of independent or liberated abbeys acknowledged no lord but the pope. In the middle ages, the so-called *abbates mitrati* frequently enjoyed episcopal titles, but only a few had dioceses. Before the period of secularization in Germany, several of the abbots in that country had princely titles and powers. In England there were a considerable number of *mitred abbots* who sat and voted in the house of lords. The election of an abbot belongs, as a rule, to the chapter or assembly of the monks, and is afterwards confirmed by the pope or by the bishop, according as the monastery is independent or under episcopal jurisdiction. But from early times, the pope in Italy has claimed the right of conferring abbeacies, and the concordat of 1516 gave that right to the king of France. Non-monastic clergy who possessed monasteries were styled *secular abbots*; while their vicars, who discharged the duties, as well as all abbots who belonged to the monastic order, were styled *regular abbots*. In France, the abuse of appointing secular abbots was carried to a great extent previous to the time of the revolution. (See **ABBÉ**.) Often monasteries themselves chose some powerful person as their secular abbot, with a view of "commending" or committing their abbey to his protection (*abbés commendataires*). In countries which joined in the reformation, the possessions of abbeys were mostly confiscated by the crown; but in Hanover, Brunswick, and Würtemberg, several monasteries and convents were retained as educational

establishments. In the Greek church, the superiors of convents are called *hegumeni* or *Mandrites*, and general abbots, *archimandrites*.

ABBOT, BENJAMIN, LL.D., 1762-1849; a New England teacher, who had among his pupils Jared Sparks, Daniel Webster, George Bancroft, Edward Everett, and others who became famous. For nearly 50 years A. was at the head of Phillips Academy, in Exeter, N. H.

ABBOT, EZRA, LL.D., b. 1819; son of a farmer; graduated at Bowdoin in 1840; spent five years in teaching in academies. In 1847 settled in Cambridge, Mass., and found employment in the libraries of Harvard college and Boston, pursuing private studies in philology and theology. In 1856 he was appointed assistant librarian in Harvard, with the exclusive duty of classifying and cataloguing the books. He resigned in 1872 to accept the Bussey professorship of New Testament criticism and interpretation in the Cambridge Divinity school. In 1852 he was a member of the American Oriental society, and became its recording secretary; in 1861 a member of the American Academy of Arts and Sciences; in 1871 University Lecturer on the Textual Criticism of the New Testament. Among his works are *New Discussions of the Trinity*, *Bibliography of the Doctrine of a Future Life*, as an appendix to Rev. W. R. Alger's *Critical History of the Doctrine*, and *The Authorship of the Fourth Gospel—External Evidences* (1880). He edited, with notes or appendixes, Norton's *Statement of the Reasons for not Believing the Doctrines of the Trinitarians*, *Lamson's Church of the First Three Centuries*, and other controversial works. He was employed on the American edition of Smith's *Dictionary of the Bible* (his bibliographical articles being especially valuable), and was a member of the American Bible Revision Committee. Among his last labors was the assistance he rendered to Dr. C. R. Gregory, of Leipsic, in the preparation of a *Prolegomena* to Tischendorf's last critical ed. of the Greek Testament. As a biblical scholar he stood in the very first rank. He d. Cambridge, 1884.

ABBOT, GORHAM DUMMER, 1807-74, teacher and writer, studied theology at Andover and took charge of a Presbyterian Church at New Rochelle, New York, but gave up preaching and established a female seminary in New York City (afterwards the Spingler Institute) where he taught for twenty-two years. He wrote *The Family at Home*, *Nathan Dickerman*, *Pleasure and Profit*, and other works.

ABBOT, HENRY LARCOM, LL.D., military engineer, born in 1831, graduated at West Point 1854; chief of artillery at Richmond and at the capture of Fort Fisher, 1864-5; chief of the U. S. engineers from 1886 to 1895, when he retired. He devised the coast defence system of submarine mines.

ABBOT, SAMUEL, 1732-1812; one of the founders of the theological seminary at Andover, Mass., toward which he gave \$20,000 in 1807, and \$100,000 more in his will. He was a successful merchant of Boston and a free donor to worthy charities.

ABBOT, WILLIS J., author, b. in 1863, best known by his *Blue Jacket* series of stories relating to the naval history of the United States and by a series of stories on the U. S. civil war.

ABBOT OF JOY (ABBÉ DE LIESSE), the title bestowed upon the chief of a brotherhood founded at Lille. He was nominated by the magistrate and people of the town, and was invested as an outward distinction of his office with a silver gilt cross, four ounces in weight, which he wore upon his hat. Accompanied by a suite of officers and servants who bore before him a standard of red silk, he presided over the games which were held at Arras and the neighboring towns during the period of the carnival.

ABBOT OF MISRULE (in Scotland, the ABBOT OF UNREASON), the person who was selected to preside over the merry revels at Christmas in the middle ages.

ABBOTSFORD, the seat of Sir Walter Scott, is situated on the south bank of the Tweed, a little above its confluence with the Gala, and about three miles from the town of Melrose. Before it became, in 1811, the property of Sir Walter, the site of the house and grounds of A. formed a small farm known by the name of *Clarty Hole*. The new name was the invention of the poet, who loved thus to connect himself with the days when Melrose abbots passed over the fords of the Tweed. On this spot, a sloping bank overhanging the river, with the Selkirk hills behind, he built at first a small villa, now the western wing of the castle. Afterwards, as his fortune increased, he added the remaining portions of the building, on no uniform plan, but with the desire of combining in it some of the features (and even actual remains) of those ancient works of Scottish architecture which he most venerated. The result was that singularly picturesque and irregular pile, which has been aptly characterized as "a romance in stone and lime." It has remained in the family for several generations. The great-granddaughter of the novelist married the Hon. Joseph Constable Maxwell, who, on becoming proprietor of A., assumed the name of Scott.

ABBOTT, AUSTIN, b. in Boston, Mass., 1831; brother of Dr. Lyman Abbott and of Benjamin Vaughan Abbott. He aided the latter in preparing the digest of the laws of the U. S. He contributed to light literature and with Benjamin and Lyman was the author of two novels, *Matthew Caraby* and *Concut Corners*. He was an able lecturer on law and was dean of the New York Law School at the time of his death, which occurred in 1896.

ABBOTT, BENJAMIN VAUGHAN, 1830-90; son of Jacob. He was educated in New York, and admitted to the bar in 1851. He produced many volumes of reports and digests

of federal and state laws, and was a member of the national commission to prepare a digest of the laws of the United States, published in 1889.

ABBOTT, EMMA A., an American vocalist, b. Chicago, 1849; appeared in concerts at the age of nine, was afterwards soprano of Dr. E. H. Chapin's church (Univ.) in New York; in 1872 went to Europe to prosecute her studies; made her début in opera, May 2, 1875, at Covent Garden theatre, London, and after a tour of the British cities appeared in New York, Feb. 7, 1877. She visited all the principal cities in Europe and America. Miss Abbott was married, Feb. 26, 1874, to Mr. E. J. Wetherell. She died 1891.

ABBOTT, JACOB, a native of Maine, born 1803 (d. 1879). He graduated at Bowdoin college in 1820. He is a remarkably voluminous writer, and has acquired a large measure of popularity from the simplicity and earnestness of his thought. He has addressed himself principally to the young, and it is perhaps not too much to say that of all works intended for the juvenile mind, his are the best in the English language. So thoughtful an instructor of youth even as Dr. Arnold speaks in high terms of *The Way to do Good*. Nearly all his books have been repeatedly republished in England, and some have been translated into various European and Asiatic languages. His most popular works are the *Rollo Books* and *The Young Christian*. He also published the *Franconia Stories; Histories of Celebrated Persons*, 30 vols.; *Harper's Story Books*, 36 vols., etc.

ABBOTT, Sir JOHN JOSEPH CALDWELL, Canadian statesman, was born in St. Andrew's, Quebec, in March, 1821. He was educated at home by his father, the Rev. Joseph Abbott, rector of St. Andrew's, and entered McGill College, Montreal. Graduating there, he studied law, and in 1847 was called to the bar of Lower Canada. In 1859 he entered political life as representative from his native county of Argenteuil in the Assembly of United Canada, and represented this constituency until the union in 1867, when he became member of the Dominion Parliament for the same place. In 1862 he was Solicitor-General in the Cabinet of John Sandfield Macdonald, but resigned before his chief lost power. Mr. Abbott, still a member of Parliament, was legal adviser to Sir Hugh Allan in his negotiations with Sir John Macdonald's Government over the proposed Canadian Pacific Railway, and the money received by Sir John in 1873 was paid by Sir Hugh at the advice of Mr. Abbott. Mr. Abbott, as a result of his share in the proceeding, spent the seven years, 1874-1880, in private life, during which time he devoted himself largely to his private practice. In 1880 Mr. Abbott re-entered Parliament, again representing Argenteuil; and in 1887 Sir John Macdonald invited him to join the Cabinet, as a Minister without portfolio, and he has sat in the council since then. Besides his Insolvency act, Mr. Abbott drafted the Jury Law Consolidation act for Lower Canada, and various financial acts. In June, 1891, on the death of Sir John Macdonald, Mr. Abbott was made Premier of the Dominion Government. Died 1893.

ABBOTT, JOHN STEPHENS CABOT, 1805-77; b. Maine; d. Conn.; brother of Gorham D. He graduated at Bowdoin, 1825; studied at Andover theol. sem.; traveled in the United States and Europe to study systems of education; was ordained as a Congregational minister in 1830, and settled successively at Worcester and Roxbury and Nantucket, Mass. In 1833 he published his first book, *The Mother at Home*, and soon afterwards *The Child at Home*. About 1844 he devoted himself solely to literary work, and rapidly produced *Kings and Queens, or Life in the Palace*; *The French Revolution of 1789*; *History of Napoleon Bonaparte*; *Napoleon at St. Helena*; *Life of Napoleon III.*; *History of the Civil War in America*; *Romance of Spanish History*; *History of Frederick the Great*.

ABBOTT, LYMAN, D.D., b. Roxbury, Mass., 1835; brother of Austin. He graduated from New York university in 1858, and went into the practice of law with his brother. Afterwards he studied theology with his uncle, Rev. J. S. C., and was ordained a Congregational minister in 1860, settling as pastor at Terre Haute, Ind., the same year. He was chosen secretary of the American Union Freedmen's Commission, holding the place till 1868. He was pastor of the New England church in New York, 1866 till 1869. Among his works are: *Results of Emancipation in the United States*; *Jesus of Nazareth: His Life and Teachings*; *Old Testament Shadows of New Testament Truths*; *The Prophets of the Christian Faith, and Christianity and Social Problems* (the two last in 1896). He edited *Sermons and Morning and Evening Exercises* from Henry Ward Beecher's writings. Later he was one of the editors of *Harper's Monthly Magazine*, and principal editor of the *Illustrated Christian Weekly*, of New York; and was associated with Rev. Henry Ward Beecher in the editorship of the *Christian Union* (now *The Outlook*), of which he afterwards became editor-in-chief. He is preparing and publishing a series of commentaries on the New Testament. In 1888 he became pastor of Plymouth church, Brooklyn.

ABBREVIATIONS are contrivances in writing for saving time and space. They are of two kinds, consisting either in the omission of some letters, or words, or in the substitution of some arbitrary sign. In the earliest times, when uncial or lapidary characters were used, abbreviations by omission prevailed, such as we find on the inscriptions on monuments, coins, etc. In these the initial letter is often put instead of the whole word, as M. for Marcus, F. for Filius. It was after the small Greek and Roman letters had been invented by transcribers for facilitating their work, that signs of abbreviation, or characters representing double consonants, syllables, and whole words, came into use. Greek manuscripts abound with such signs, and often only one that has expressly studied Greek palæography can make them out. From the manuscripts they passed into the early printed editions of Greek books, and it is only recently that they have quite disap-

peared. Among the Romans, signs of abbreviation were called *notæ*, and professed scribes who employed them were *notarii*. To such an extent was the system carried, that L. Annaeus Seneca collected and classified 5000 abbreviations. The same practice has prevailed in all languages, but nowhere more than in the rabbinical writings.—The abbreviations used by the ancient Romans were continued and increased in the middle ages. They occur in inscriptions, manuscripts, and legal documents; and the practice continued in these last long after the invention of printing had made it unnecessary in books. An act of parliament was passed in the reign of George II., forbidding the use of abbreviations in legal documents. Owing to these abbreviations, the deciphering of old writings requires special study and training, and forms a separate science called *diplomatics* (q.v.), on which numerous treatises have been written. Tassin's *Nouveau Traité de Diplomatique* (6 vols., Par. 1750–65) contains, in the third volume, an exposition of Roman abbreviations. Other works on the subject are—Gatterer's *Abriss der Diplomatik* (2 vols., Gott. 1798); Pertz's *Schrifttafeln* (4 Nos., Hannov. 1846); and Kopp's *Palæographica Critica* (4 vols., Manh. 1817–29).—In ordinary writing and printing few abbreviations are now employed. The sign &, originally an abbreviation for the Lat. *et*, “and,” is perhaps the only one of the arbitrary kind still to be met with. It does not stand properly for a *word*, for it is used in different languages, but for an idea, and is as much a symbol as +. The abbreviations by using the initials of Latin words that are still in use are chiefly confined to titles, dates, and a few phrases; as M.A. (*magister artium*), Master of Arts; A.D. (*anno domini*), in the year of our Lord; *e.g.* (*exempli gratiâ*), for example. Many are now formed from English words in the same way; as F.G.S., Fellow of the Geological Society; B.C., before Christ.—Most of the sciences and arts have sets of signs of abbreviations, or symbols, peculiar to themselves, and of great use both for brevity and clearness. See ATOMIC WEIGHTS; CHEMICAL NOMENCLATURE, etc.

The following is a list of the more important Abbreviations in general use

Abp., Archbishop.
A.C. (*Ante Christum*), Before Christ.
A.D. (*Anno Domini*), In the year of our Lord.
A.H. (*Anno Hegiræ*), In the year of the Hegira.
Ad Lib. (*ad libitum*), At pleasure.
A.M. (*Ante Meridiem*), Before noon; (*Anno Mundi*), In the year of the world.
A.R.A., Associate of the Royal Academy (London).
A.R.S.A., Associate of the Royal Scottish Academy.
A.U.C. (*Ab Urbe Condita*), From the building of the city—that is, Rome.
B.A. or A.B. (*Artium Baccalaureus*), Bachelor of Arts.
Bart. or Bt., Baronet.
Bbl., Barrel.
B.C., Before Christ.
B.C.L., Bachelor of Civil Law.
B.D., Bachelor of Divinity.
B.M., Bachelor of Medicine.
Bp., Bishop.
C. (*Centum*), A hundred; chapter; c., century. Also C = Centigrade.
Cantab. (*Cantabrigiensis*), Of Cambridge.
Capt., Captain.
C.B., Companion of the Bath.
C.E., Civil Engineer.
cf. or cp., Confer; compare.
C.M.G., Companion of the Order of St. Michael and St. George.
Cr., Creditor.
Crim. Con., Criminal conversation.
Cwt., Hundred-weight.
D.C.L., Doctor of Civil Law.
D.D., Doctor of Divinity; *Dono dedit*.
D.D.S., Doctor of Dental Surgery.
D.G. (*Dei Gratiâ*), By the grace of God.
Do. (Ital. *ditto*, “said”), The said; the same.
Dr., Doctor, or Debtor.
D.V. (*Deo Volente*), God willing.
dwt., Pennyweight.
e.g., or ex. gr. (*Exempli Gratiâ*), For example.
Etc. (*Et cætera*), And the rest; and so on.
F.D. (*Fidei Defensor*), Defender of the Faith.
ff., following.
F.G.S., Fellow of the Geological Society.
F.M., Field-marshal.
F.R.A.S., Fellow of the Royal Astronomical or of the Royal Asiatic Society.
F.R.C.P., Fellow of the Royal College of Physicians.
F.R.C.S., Fellow of the Royal College of Surgeons. E., of England.
F.R.G.S., Fellow of the Royal Geographical Society.
F.R.S., Fellow of the Royal Society. L., London; E., Edinburgh.

- G.C.B., (Knight) Grand Cross of the Bath.
 G.C.H., (Knight) Grand Cross of Hanover.
 G.C.M.G., (Knight) Grand Cross of St. Michael and St. George.
 Gr., Greek; Lat., Latin; Ital., Italian, etc.
 H.E.I.C.S., Hon. East India Company's Service.
 H.M.S., His or Her Majesty's Service, or Ship.
 H.R.H., His or Her Royal Highness.
 Ib. or Ibid. (*Ibidem*), In the same place.
 I.C.TH.U.S. (*ιχθυς*), *Iesus Christos, Theou Huios, Soter*—Jesus Christ, the Son of God, the Savior.
 Id. (*Idem*), The same; (*Idus*), The Ides.
 i.e. (*Id est*), That is.
 I.H.S., * *Iesus Hominum Salvator*, Jesus the Savior of men; *In hac (Cruce) Salus*, In this (cross) salvation.
 Incog. (*Incognito*, Ital.), Unknown.
 I.N.R.I. (*Iesus Nazarenus Rex Iudaeorum*), Jesus of Nazareth, king of the Jews.
 Inst. (*Instante*—*mense* understood), Instant, of the present (month); Institute.
 I.P.D. (*In Præsentia Dominorum*), In presence of the Lords (of Session).
 J.C. (*Juris Consultus*), Juris-consult.
 J.P., Justice of the Peace.
 J.V. (or U.) D. (*Juris Utriusque Doctor*), Doctor both of Civil and of Canon Law.
 Kal. (*Kalendæ* or *Kalendis*), the Kalends.
 K.B., Knight of the Bath.
 K.C.B., Knight Commander of the Bath.
 K.C.H., Knight Commander of the Order of Hanover.
 K.C.M.G., Knight Commander of St. Michael and St. George.
 K.G., Knight of the Garter.
 K.H., Knight of Hanover.
 K.M., Knight of Malta.
 K.P., Knight of St. Patrick.
 K.T., Knight of the Thistle.
 Κ. τ. λ., *Και τα λειπομενα* (*Kai ta leipomena*), same as "Et cætera."
 Lb. (*libra*), Pound.
 L.D., Lady Day.
 L.H.D. (*Litterarum Humaniorum Doctor*), Doctor of Literature.
 LL.B. (*Legum Baccalaureus*), Bachelor of Laws (the plural being denoted by the double L).
 LL.D. (*Legum Doctor*), Doctor of Laws.
 L.R.C.S., Licentiate of the Royal College of Surgeons.
 L.S.D. (*Libræ, Solidi, Denarii*), Pounds, shillings, pence.
 M. (*Mille*), A thousand.
 M.A. or A.M. (*Artium Magister*), Master of Arts.
 Mass., Massachusetts; Vt., Vermont; Pa., Pennsylvania; etc. See UNITED STATES.
 M.D. (*Medicinæ Doctor*), Doctor of Medicine.
 M.P., Member of Parliament.
 M.R.C.S., Member of the Royal College of Surgeons.
 M.R.I.A., Member of the Royal Irish Academy.
 MS., Manuscript; MSS., Manuscripts.
 Mus. D. (*Musicæ Doctor*), Doctor of Music.
 M.W.S., Member of the Wernerian Society.
 N.B. (*Nota bene*), Mark well; observe.
 Nem. con. (*Nemine contradicente*), or Nem. diss. (*Nemine dissidente*), No one contradicting or dissenting; unanimously.
 N.P., Notary Public.
 N.S., New Style.
 O.S., Old Style.
 Oxon. (*Oxoniensis*), Of Oxford.
 oz., Ounce.
 P., President; professor, etc.
 P.C., Privy Councillor.
 P.C.S., Principal Clerk of Session.
 Per ann. (*Per annum*), By the year.
 Per cent. (*Per centum*), By the hundred.
 Ph.D. (*Philosophiæ Doctor*), Doctor of Philosophy.
 P.M. (*Post Meridiem*), After noon.
 P.P., Parish priest.

* This was originally \overline{IHS} , the first three Greek letters of the name Jesus; but its origin having been lost sight of, by substituting S for Σ , and then mistaking the Gr. H (*eta*) for Lat. H, a signification was subsequently found out for each letter. The symbol was still further altered by converting the horizontal stroke, which was the usual sign of abbreviation, into a cross, as it now generally appears.

pp., Pages.

Pro tem. (*Pro tempore*), For the time.

Prox. (*Proximo*), In the next (month).

P.S. (*Post scriptum*), Postscript.

Q., Query or Question.

Q.C., Queen's Counsel.

Q.E.D. (*Quod erat demonstrandum*), Which was to be demonstrated.

Q.E.F. (*Quod erat faciendum*), Which was to be done.

Q.S. (*Quantum sufficit*), Enough.

q.v. (*Quod vide*), Which see.

R. (*Rex* or *Regina*), King or Queen.

R.A., Royal Academician; Royal Artillery.

R.E., Royal Engineers.

R.M., Royal Marines.

R.N., Royal Navy.

R.S.A., Royal Scottish Academician.

S., South; saint; seconds.

Sc., *Scilicet*, same as *viz*.

S.L., Solicitor at Law.

S.M. (*Sa Majesté*), His or Her Majesty.

S.P.Q.R. (*Senatus Populusque Romanus*), The Roman senate and people.

Sq. (*Sequens*), The following; Sqq., Do. in the plural.

S.S.C., Solicitor before the Supreme Courts.

S.T.P. (*Sanctæ Theologiæ Professor*), Professor of Theology.

T.C.D., Trinity College, Dublin.

Ult. (*Ultimo*—*mense* understood), In the last (month).

U.P., United Presbyterian.

U.S., United States; United Service.

V.D.M. (*Verbi Dei Minister*), Preacher of the Word.

Viz. (*Videlicet*), To wit; namely.

W.S., Writer to the Signet.

Xmas., Christmas. Xian., Christian, etc.

Y, Y'; The, That. (This use of Y originated in the Anglo-Saxon character **ƿ**, which was equivalent to the modern *th*. In manuscripts, this character degenerates into a form like a black letter *y*, which was retained in these contractions after its origin and real sound had been lost sight of.)

Besides the generally current abbreviations given above, other short methods of statement are frequently employed in particular circumstances. In the present work, for instance, in which the saving of space is of great moment, when the title or heading of a subject recurs in the body of the article, it is generally—especially if a proper name—represented by its initial letter: e.g., A. for Abd-el-Kader. Two dates thus (1215–1250), following the name of a king, a pope, etc., indicate briefly the beginning and end of his reign or term of office; or thus (b. 1215—d. 1250), the dates of his birth and death. The meaning of these and similar contractions is in general sufficiently obvious from the connection in which they stand. In the United States there are fewer A. used than in England, as there are no titles except the names of offices. But a great variety are peculiar to the country, such as *Hon.* for member of Congress, and indeed almost any one of note; *Esq.*, usually written after names in addressing letters. In politics, *Rep.*, *Dem.*, *Prohib.*, *Pop.*, for Republican, Democratic, Prohibition and Populist parties; *H. R.*, for House of Representatives; *Sen.*, for Senate; *U.S.S. Ct.*, for United States Supreme Court, etc. Names of States are almost invariably abbreviated, and the contractions are well known; also *Co.* for county. Military and naval, such as *Maj.*, *Gen.*, *Col.*, *Lt.*, *Adml.*, *Com. Capt.*, are used. In commerce, *C.O.D.*, “collect on delivery,” is much used; in art, A. stands for Academician; *N.A.D.*, for National Academy of Design. *A.S.A.* denotes American Statistical Association. In money, only the \$ mark and *cts.* are common. Certain trades have their peculiar contractions, such as booksellers, paper-makers and others. In printing, the use of A. depends much upon the nature of the work. If technical, as in chemistry, arithmetic, or astronomy, contractions or peculiar signs are used in profusion, for oxygen and other elements and combinations; for notation, relation, and equality; for sun, moon, planets, and their aspects. In weights and measures the *lb.*, *oz.*, *ft.*, *deg.*, etc., are used. The legal profession has its peculiar contractions. Time is noted in *yr.*, *mo.*, *hr.*, *min.*, and *sec.* Orders in *F.* and *A.M.*, *I.O. of O.F.*, etc. The church in *Abp.*, *Bp.*, *Dea.*, *Rev.*, *D.D.*; and *M.E.P.*, *Bap.*, *R.C.*, etc.

ABBT, THOMAS, 1738–66; a German author, educated at Halle university, and professor of mathematics at Rinteln. He did much toward the improvement of the language of his country. Of his books the more important are those *On Merit*, and *On Dying for our Native Country*.

A. B. C. PROCESS. A process of deodorizing impurities, i.e., by Alum, Blood, Charcoal.

ABD signifies in Arabic “slave” or “servant,” and enters, along with the name of God, into the composition of many proper names; as Abd-Allah, “servant of God;” Abd-el-

Kader, "servant of the mighty God;" Abd-ul-Latif, "servant of the gracious God," etc. So *Ebed* in Hebrew and Syriac.

ABDALLAH-BEN-ABD-AL-MOTTALIB, 545-570; the father of Mohammed. He was an only child, and was about to be sacrificed by his father when another person interfered and persuaded the father to sacrifice a hundred camels instead of the boy. Soon after A. married a daughter of Wabib, a Benu Zahra chief, and of this union came the great prophet.

ABDALLAH-BEN-AL-AFTAS, 1004-60; founder of the dynasty of Bencee Al-Aftas in Africa. His military talents secured for him the title of "The Victorious."

ABDALLAH-BEN-YASEEN lived in the early part of the 11th century, and founded the Almoravides dynasty in Northern Africa. He was a zealous follower of the prophet, and converted pagans by the sword rather than the book. Though holding supreme authority for a long time, he was content with the title of "Theologian." The reign of his successors lasted about a century.

ABDALLAH-BEN-ZOBAIR, b. about 622, d. 692; the first of Mohammed's disciples; son of Zobair, one of the prophet's friends and companions. His mother was a sister of Mohammed's favorite wife. Abdallah opposed Ali, the elected successor and nephew of the prophet, and renewed his struggle for supremacy after Ali's assassination. He seized Mecca, holding it against Yezid, caliph of Damascus. During the siege the temple of the Holy Caaba was destroyed, but Yezid's death saved the city from capture. A. was acknowledged caliph of Mecca, and rebuilt and restored the city by 685. The Damascus caliphs renewed the war, and Mecca was again besieged, but stoutly defended by A. in his seventieth year. Finally Mecca was taken by assault, and A., who retreated within the Caaba, was slain.

ABDALS, Persian religious fanatics who deem it meritorious to slay any one of a different faith, and if slain themselves in the attempt are considered martyrs.

ABDAS, a saint in the Roman Catholic and Greek churches. He was a bishop in Persia about the beginning of the 5th c. who destroyed a temple of the fire-worshippers, refusing to rebuild it, though commanded by the king to do so. In retaliation A. was killed and all the Christian churches were destroyed, the persecution lasting more than a quarter of a century, and causing a war between Rome and Persia.

ABD-EL-HALIM, b. in Cairo, 1826; son of Mehemet Ali; educated in Paris. Before the viceroy of Egypt was recognized by the sultan, Halim was a member of the family council; in 1856 he was governor of Khartoum.

ABD-EL-HAMID, 1812-67, the adopted name of DE COURET, a French traveler in the East, who was sent on a mission to Timbuctoo in 1848. Alexandre Dumas used his adventures in "The Pilgrimage of Hadji Abd-el-Hamid Bey," 1855.

ABD-EL-KADER, properly El-Hadji-Abd-el-Kader-Ulid-Mahiddin, was the descendant of a Marabout family of the race of Haschem, who trace their pedigree to the caliphs of the lineage of Fatima. He was born, 1807, at Ghetna, an educational institution of the Marabouts near Mascara, which belonged to his family. His father, who died in 1834, being esteemed a very holy man, had exercised great influence over his countrymen, which influence he bequeathed to his son. In his eighth year A. made a pilgrimage to Mecca with his father; and in 1827 he visited Egypt, where, in Cairo and Alexandria, he first came in contact with western civilization. Religious enthusiasm and melancholy were the most prominent features of his character. He early showed an uncommonly gifted mind, and at the chief school of Fez he acquired such knowledge as composes Arabian science. A. was free from the savage cruelty, as well as from the sensuality, of the Arabs; he maintained purity of manners, and did not suffer himself to be misled by anger or passion. Although he firmly adhered to the faith of his nation, and used their fanaticism as one of his most important sources of influence, yet he had no sympathy with the fanatical intolerance of the majority among them. His public career began at the time of the conquest of Algiers by the French. No sooner was the power of the Turks broken, than the Arabian tribes of the province of Oran seized the opportunity to make themselves independent. Having got possession of Mascara, they elected A. as their emir, who soon succeeded in establishing his authority over a number of the neighboring tribes. He now attacked the French; and some bloody battles, fought on Dec. 3, 1833, and Jan. 6, 1834, against Gen. Desmichels, then commanding in Oran, obliged the latter to enter into a treaty with him. In the interior of the country the power of A. now spread in an alarming way. In consequence of victories over neighboring chiefs, he became master of Miliana and Medeah. All the cities and tribes of the provinces of Oran and Titèri acknowledged A. as their sultan; the more distant tribes sent him ambassadors with presents. It was not long before hostilities broke out between him and the French. The commencement was favorable to him, for the first operations of Gen. Tretzel led to that fatal retreat, during which the French army was attacked at Makta, on June 28, 1835, by the whole assembled forces of A., amounting to nearly 20,000 cavalry, and suffered a disgraceful defeat.

After a protracted struggle of six years, A. found himself obliged (1841) to take refuge in Morocco. Here he succeeded in getting up a sort of crusade against the enemies of

Islam; and the arms of France were now turned against Morocco for the countenance given to A. After the decisive battle of Isly (1844) the sultan was obliged to give up A.'s cause, but soon found that the latter was at least his equal in power, and that he could not even prevent him from marching out of Nedem to attack the French again, both in Oct. 1845, and in Mar. 1847. But the star of A. was now about to set. In the night of the 11th Dec. he made a bold attack on the Moorish camp, in which he was defeated and had to resolve on flight. He might easily have secured his own safety, but he would not abandon his attached followers, men, women, and children, to the plunder and massacre of the Moroccans. After a heroic combat on the 21st December, he effected their retreat across the Muluia into the territory of Algeria, where they mostly surrendered to the French. He himself, with a few horsemen, resolved to fight his way through to the south; but coming to the Pass of Kerbous, he found the way closed and was received with musketry. Dispirited at length, A. surrendered, on Dec. 22, 1847, to Gen. Lamoricière and the Duc d'Aumale, upon condition that he should be permitted to withdraw either to Egypt or to St. Jean d'Acre. The French government refused to ratify this agreement. A. was sent with his family to Toulon, whence he was removed in 1848 to Pau, and finally to the Château d'Amboise. Liberated in 1852 by Louis Napoleon, he lived at Brussa, in Asia Minor, till its destruction by an earthquake in 1855. He then, for a time, lived in Constantinople, but finally made his home in Damascus. He was of great service to humanity during the Syrian massacres of 1860. In 1865 he visited Paris and England, and was present at the Paris exhibition in 1867. In his retirement he wrote a religious work, a translation of which was published at Paris, 1858, under the title, *Rappel à l'Intelligent: avis à l'Indifferent*. D. 1883.

ABDE-EL-WAHÂB'. See WAHABIS.

ABDE'RA, a maritime t. of Thrace, e. of the mouth of the Nestus. About 400 B.C. it was a flourishing place. The inhabitants became proverbial for stupidity, though such men as Protagoras, Democritus, and Anaxarchus, the Philosophers, Hecætæus, the historian, and Nicænetus, poet, were born there.

ABDICATION is the act of giving up an office, generally the office of ruler or sovereign. It is rarely done out of pure preference of a private station, but is generally the result of vexation and disappointment. It was perhaps voluntarily, and from being wearied with dominion, that Diocletian, and along with him Maximian, abdicated (305). Christina of Sweden retired from the throne (1654) out of preference for the freedom of private life, but wished still to exercise the rights of a sovereign. Charles V. laid down the crown (1556) because his great schemes had failed. Philip V. of Spain did so (1724) in a fit of melancholy, but resumed it on the death of his son. Amadeus of Savoy abdicated (1494) to become a priest. Victor Amadeus of Sardinia, who abdicated in 1730, wished to recall the step, but was not allowed. Louis Bonaparte resigned the crown of Holland, because he would not consent to treat that country as a province of France. Charles Emanuel of Sardinia retired from the throne in 1802, not finding himself equal to the crisis; and the same was the case with Victor Emanuel in 1819. William I. of the Netherlands resigned (1840), as his policy had become impossible from the turn of affairs in Belgium. Foreign force compelled the abdication of Augustus of Poland (1707), and later, that of Stanislaus Leszczyński (1735) and of Poniatowski (1795); as well as that of Charles IV. of Spain (1808), and of Napoleon (1814 and 1815). Insurrections have been the most frequent cause of forced abdications. The early history of the Scandinavian kingdoms abounds in instances. In England, the compulsory abdication of Richard II. (1399) is an early example. In the case of James II. it was disputed whether the king had "abdicated" or "deserted." More recent times saw Charles X. (1830) and Louis Philippe (1848) retire before the storm of revolution, without the conditions they made being regarded. The abdication of Ferdinand of Austria (1848) was an indirect consequence of the events of the year of revolutions; that of Charles Albert of Sardinia (1849), of the battle of Novara. Of several cases among German princes, the chief is that of Ludwig of Bavaria (1848). A late instance is that of Amadeus, king of Spain, who felt himself obliged to give up his crown on the 11th of February, 1873.

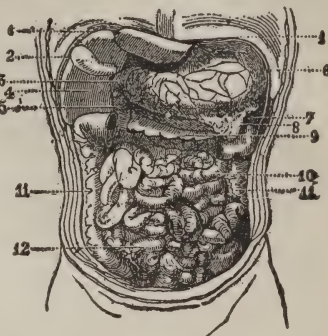
In some countries, the king can abdicate whenever he pleases; but in England, the constitutional relation between the crown and the nation being of the nature of a contract, the king or queen, it is considered, cannot abdicate without the consent of parliament. It is, however, said that the king does abdicate, or, to speak perhaps more correctly, an A. may be presumed, and acted on by the people, if his conduct politically and overtly is inconsistent with, and subversive of, the system of constitutional government, of which the qualified monarchy of his office forms part.

At the conference between the two houses of parliament previous to the passing of the statute which settled the crown on William III., it would appear that the word "abdicated" with reference to king James II. was advisedly used instead of "deserted"—the meaning, it is presumed, being that king James had not only deserted his office, but that by his acts and deeds, of which the said desertion formed part, he had, in view of the constitution, ceased to have right to the throne. From this it may be inferred that A. was considered to have a twofold political signification, involving maladministration as well as desertion. The Scotch convention, however, more vigorously and distinctly

resolved that king James "had forefaulted [forfeited] the crown, and the throne was become vacant."

AB DIEL, in "Paradise Lost," the faithful angel who opposed the revolt in heaven begun by Satan.

ABDO MEN. The trunk of the human body is divided by the diaphragm into two cavities—the upper being the thorax or chest, and the under, the abdomen or belly. Both the cavity and the viscera it contains are included in the term A. It contains the liver, pancreas, spleen, and kidneys, as well as the stomach, small intestine, and the colon. The lower bowel, the bladder, and internal organs of generation lie in the lowest part of the cavity, which is called the pelvis. The A. is lined by a serous membrane, the peritoneum, which is folded over the viscera, allowing them a certain freedom of motion, but keeping them in their proper relations to each other. The A. is divided externally by two horizontal lines into three principal regions—the upper or epigastric, the middle or umbilical, and the lower or hypogastric. These are again subdivided by two vertical lines—the side-divisions being called the hypochondriac, lumbar, and iliac regions respectively; the names epigastric and umbilical are then applied in a restricted sense to the middle divisions of the two upper principal regions; while the middle division of the lower is called the region of the pubis. Diseases of the abdominal viscera are frequent, and chiefly consist either of chronic disorders of the digestive organs, or of derangements of the nerveplexuses and ganglia there situated. These disorders announce themselves partly in bodily pain, and partly in mental affections, such as hypochondria and hysterics.



ORGANS OF THE ABDOMEN.

1. Diaphragm. 2. Gall-bladder. 3. Pyloric end of Stomach. 4. Right lobe of Liver. 5. Duodenum. 6. Great end of Stomach. 7. Spleen. 8. Piece of Caul, or Omentum. 9. Pancreas (Sweetbread). 10. Small Intestine (Jejunum). 11. Great Intestine (Colon). 12. Small Intestine (Ilium).

ABDOMEN, in Entomology, the last of the three parts into which the body of an insect is divided. It is composed of a number of rings or segments, frequently nine, more or less distinct from each other. It contains a portion of the intestines and the sexual organs. In the perfect insect, its segments bear no legs nor wings; but the hind legs of larvæ or caterpillars, which afterwards disappear, are attached to them. In many insects, its last segments bear appendages of various uses and forms, as pincers, stings, borers or of ovipositors, etc. See **REGIONS OF THE BODY**.

ABDOMINAL/ES, or abdominal fishes, in the Linnæan arrangement, an order of fishes including all the osseous fishes of which the ventral fins are placed upon and beneath the abdomen, and so behind the pectoral fins. Subsequent naturalists have thought it right in classifying fishes to give a higher place to other characters; and in the system of Cuvier, the name A. is given to an order of much more limited extent, a subdivision of the *malacopterygii* of soft-rayed osseous fishes, distinguished by having the ventral fins placed beneath the abdomen and not attached to the bones of the shoulder. It includes the *cyprinidæ* (carp, minnow, etc.), *esocidæ* (pike, etc), *siluridæ*, *salmonidæ* (trout, salmon, etc.), and *clupeidæ* (herring, etc.).

ABDUCTION, in the criminal law of England, signifies the unlawful taking away of the person of a female. Such is the usual limitation of the word; although, under the Jewish law, and subsequently according to the principles of the civil law, the A. or "stealing" of the person was applied to the male sex, as well as to women, coming more nearly to what we now understand by *kidnapping* (q.v.). In the civil law, the offence was called *plagium*, or *crimen plagii*, under which name it still has a place in the Scotch criminal law, and, in practice, is applied to the A. of children of either sex, or of women generally. The A. may be accomplished either by force or by any fraudulent or sinister means; and this latter quality seems more appropriate to the strict meaning of the term, as derived from the Latin verb *abducere*, to lead off, or induce, or persuade away.

It is still doubtful whether the earlier English statutes upon this subject have become a part of the common law in the United States. The question seems not to have been passed upon in the colonial period. At present there are legislative enactments in the various states which cover substantially the ground of the English statutes. The statutes of many of the states also include within their provisions the seizing or carrying away of a person with intent to cause him to be confined within the state, or to be sent out of the state to be sold as a slave, or in any way held in service against his will. The U. S. Revised Statutes provide that every person who entices or carries away any person to be held as a slave, or to be sent out of the country to be so held by another, shall be punishable by fine not more than \$5000, or by imprisonment not more than five years, or both.

ABD-UL-AZIZ, b. Feb. 9, 1830; d. June 4, 1876; second son of Mahmoud II., and thirty-second sultan of the Turkish empire. In early life he had a fondness for agriculture, and established a model farm. On succeeding his brother Abd-ul-Medjid, June 25, 1861, he gave many promises of reform, and was thought to be brave and patriotic. He began by reducing his own civil list to \$3,000,000, and dismissing his brother's seraglio. But his reforms achieved nothing, and dissatisfaction at home and abroad became intense. In 1867 he made a tour of Europe, visiting the Paris exhibition and several capitals, in which he spent a vast amount of money to little purpose. The knowledge of better civilization determined him to do something practical, and in 1868 he changed the formation of the council of state, which he wished to make the central government for the empire. To his new council of thirty-four Mohammedans and sixteen Christians he promised more reform and an attempt to assimilate with western civilization; but the war in Candia took his attention, and a war with Greece was probable. The Greek difficulty was arranged by a conference at Paris, and the sultan turned his attention to Egypt, where the Khédive, Ismail Pasha, contemplated casting off Turkish allegiance; but instead of rebelling Ismail visited Constantinople to effect an arrangement. Learning the sultan's financial embarrassment, he got important concessions, among them a new law of succession for his house, and nearly all the prerogatives of an independent sovereign. The sultan's affairs grew desperate; one ministry followed another at short intervals, and Ignatieff, the Russian ambassador became all-powerful with the distressed ruler. When the revenues were so low as barely to pay interest on the public debt, a revolt began in Herzegovina, and soon spread over all Bosnia. With an empty treasury, the sultan could not properly meet this rebellion, and the *softas* (theological students) demanded his abdication; the council of ministers determined upon his removal, and made his nephew, Murad V., his successor. A few days after his deposition (May 30, 1876), Abd-ul was found dead in his apartments. A jury of physicians decided that he died from severing the arteries of his arms, and it was believed that he committed suicide.

ABD-UL-HAMID, 1725-89; Sultan of Turkey and son of Ahmed III., succeeded his brother, Mustapha III., in 1774. He was twice involved in wars with Russia, and in 1788 was defeated at Oczakow, a humiliation that doubtless hastened his death.

ABD-UL-HAMID II., born Sept. 22, 1842; Sultan of Turkey; son of Abd-ul-Medjid; succeeded his brother Murad V., Aug. 31, 1876. He was with Murad and his uncle (Abd-ul-Aziz) at the Paris Exhibition in 1867. He developed a taste for study, particularly for geography, making an extensive collection of maps, military and statistical. He belongs to the old or orthodox Turkish party, and is a strong opponent of the young Turkish party. Under his rule the Turkish Empire has lost some of its richest provinces in Europe. The treaty of Berlin, which concluded the war with Russia in 1878, virtually deprived him of Bulgaria, Bosnia, and Herzegovina, and threatened the ultimate extinction of Turkish power in the Balkan Peninsula. It also bound him to introduce reforms in the administration of his Christian provinces. In 1894-6 a series of massacres and other outrages in Armenia (q. v.), which excited the indignation of the civilized world, led the signatory powers of the treaty of Berlin to exert a severe pressure on him. He denied the charge that the reforms promised had not been carried out, but in 1894 ordered a commission of inquiry. To this body the signatory powers submitted a plan of reform, which, under pressure, was approved. Further outrages and indifference to reform brought from the powers an imperative note (Aug. 1895) and led to the assembling of many war-ships near the Dardanelles in Oct. Lord Salisbury declared (Nov. 9) that the causes of disorders in Turkey must be reformed and that the powers would enforce the demand. The Sultan promised a constitution; then refused to proclaim it. Massacres and outrages continued through 1896; and (Dec. 23d) the ambassadors of the powers at Constantinople were instructed to submit fresh demands for reform and to enforce them, if necessary.

ABD-UL-LATIF, a celebrated Arabian writer of multifarious acquirements, was born at Bagdad in 1161. During his youth he underwent an amazing amount of mental drudgery, in accordance with the eastern fashion of his time, in order to fit himself for becoming a scholar. The ordeal consisted in his committing to memory a large number of standard works, such as the Koran, the novels of Hariri, and not a few grammatical treatises. To complete his culture in the various branches of Mohammedan lore, he betook himself to Damascus, where the famous Saladin had gathered round him the most learned men of the time. Through the liberality of the sultan, and the kindness of the vizir Fadhel, he was enabled to proceed to Egypt, where he delivered lectures while Saladin was fighting the Lion-heart at St. Jean d'Acre. Here he became intimate with Moses Maimonides, the great Jewish writer. He now devoted himself chiefly to the study of medicine, although, while at Cairo, he also wrote his excellent and accurate work on Egypt, which was translated into Latin by Professor White, of Oxford, in 1800, and into French by baron de Sacy in 1810. He died at Bagdad in 1231, on his way to Mecca.

ABD-UL-MEDJID-KHAN, the grand sultan, was born on the 23d April, 1823, and succeeded his father, Mahmoud II., July 1, 1839. The Turkish empire was then in a very dangerous position. The army had been defeated and dispersed by the Egyptians in the battle of Nisib (June 29, 1839), and there was nothing to hinder the victorious Ibrahim Pasha from advancing on Constantinople, where a large party were favorable to the

Egyptian power. This party wished to make the viceroy of Egypt, Mehemet Ali, **chakan** (the ancient title of the grand sultan) of both seas. He was the only man, they maintained, capable of upholding the banner of Islam against the unbelievers both within and without. Had it not been for the intervention of the Christian powers, the house of Osman was lost. The treaty of July, 1840, from which France kept aloof, rescued the young Padishah from sure destruction. Mehemet Ali had to submit (Nov. 27, 1840); and the treaty of July, 1841, to which France subsequently adhered, settled the future dependent relation of Egypt to Turkey. The sultan, though not very energetic in body or mind, proceeded in the path of reform begun by Selim III. and Mahmoud II. In this he had for his chief adviser Reshid Pasha, an intelligent and humane mussulman, educated in France. The aim of all his measures was to place the Osman population on a footing with the civilized inhabitants of the west. A. wished the happiness of all his subjects, without respect to creed. A sort of proclamation of their rights was issued in the hatt-i-sherif of Nov., 1839. This was followed by numerous reforms in all departments; and in 1850 the professors of all religions were decreed equal in the eye of the law. That these decrees remained, in a great measure, a dead letter, is not attributable to the will of the sultan. The chivalrous part acted by A. (1850) in refusing, at the risk of losing his throne, to give up Kossuth and the other political refugees to the menaces of Russia and Austria, will make his name remembered in the annals of humanity.

The sovereigns of Turkey have long been in an anomalous position. The ambassadors of the great powers have ruled the divan; and the sultan had a specially difficult part to play during the war with Russia (1854-56), and the diplomatic negotiations consequent to it. A. was the thirty-first sovereign of the race of Osman. On the death of A. in 1861, his brother, Abdul-Aziz (b. 1830), succeeded him; but when Abdul-Aziz was deposed in May, 1876, A.'s eldest son, Mohammed Murad (b. 1840), became sultan for a few months, and then made way in August for the second son, Abdul-Hamid.

ABD-UR-RAH'MAN, Sultan of Fez and Morocco, b. 1778, was the rightful heir to the throne when his father died, 1794; but was superseded by an uncle, after whose death he ascended the throne, 1823. His first four years of rule were occupied in quelling insurrections. Next, some danger to the state of Morocco was threatened by the refusal of Austria to pay the tribute for safety against pirates; but the sultan wisely adjusted the dispute by relinquishing this sort of "black-mail," formerly levied by Morocco on European ships in the Mediterranean. The religious war under Abd-el-Kader against the French in Algeria involved the sultan in its movements; but was concluded by the battle of Isly, 1844, and the subsequent mediation of England. The piratical habits of his subjects brought A. to the brink of war with more than one European state. The sultan was a zealous mussulman, without the wild fanaticism common among his countrymen; as a ruler, he was strict, and often cruel. He died in 1859 and was succeeded by his eldest son, Sidi-Mohammed (b. 1803—d. 1873).

ABDURRAHMAN KHAN, or **ABDUL-RAHMAN**, Ameer of Cabool, b. abt. 1830. On the death of his grandfather, Dost Mohammed, the "Great Ameer," in 1863, A. supported the pretensions of his father, Afzool Khan, against the chosen successor, Shere Ali, but the rebels were finally defeated in 1869. A. fled to Russia, was recalled by the British after the defeat of Yakoub Khan, son of Shere Ali, and proclaimed Ameer of Cabool, 1880, July 22. His relations with Great Britain have been friendly, and in 1895 his son visited London.

ABECEDARIANS, a sect of German anabaptists, followers of Storck, a disciple of Luther. They believed it was best not to know how to read, since the holy spirit would convey knowledge of the scriptures directly to the understanding.

ABECEDARY CIRCLES. Rings of letters described around magnetized needles, by which friends were supposed to be able to communicate by looking at them at certain fixed times.

A'BECK'ET, THOMAS. See **BECKET**.

A'BECKETT, ARTHUR WILLIAM, son of Gilbert Abbott A'Beckett (q. v.), was born at Hammersmith, England, Oct. 25, 1844. He entered the civil service, but soon left to become a journalist. He was editor of various comic periodicals and monthly magazines. In 1870-71, he was special correspondent to the *Standard* and *Globe* during the Franco-Prussian war. In 1874 he went on the staff of *Punch* and in 1891 became editor of the *Sunday Times*. He is the author of several novels and comedies.

A'BECK'ETT, GILBERT ABBOTT, b. London, 1811; d. Boulogne, 1856; an English humorous writer; at an early age he wrote burlesque dramas. He was correspondent and contributor for several journals, particularly *Punch* and *Figaro* in London. His principal works are: *Comic Blackstone*, *Comic History of England*, *Comic History of Rome*, *The Quizziology of the British Drama*, and many articles in *Punch*. In 1849 he was a police magistrate, in which office he displayed remarkable ability.

A'BEGG, JULIUS FRIEDRICH HEINRICH, German jurist; 1796-1868; he lectured on law at Königsberg in 1826; was professor of law at Breslau, and delegate of the legal faculty to the Prussian national synod in 1846. A. was an influential writer upon criminal administration.

ABEL appears in the book of Genesis as the second son of Adam, and a shepherd. He was slain by his elder brother Cain, under the influence of jealousy, because the offering of the latter had been rejected by Jehovah, and that of the former accepted. It is not said in Genesis why Jehovah accepted the sacrifice of Abel; but the Savior, in the New Testament, speaks of "righteous Abel," from which it is concluded that there dwelt in him a spirit of faith or trust in the unseen God, of which his brother was destitute. The writer of the epistle to the Hebrews opens his enumeration of the "faithful" in the 11th chapter of Hebrews, with these words: "By faith Abel offered unto God a more excellent sacrifice than Cain." Such, also, has been in all ages the universal opinion of the Christian church, which has regarded Abel as a type of innocence and faith.

ABEL, KARL FRIEDRICH, musician, b. in Koethen, Germany, about 1725; d. in London, June 22, 1787. He was a pupil of Sebastian Bach, and for some years a member of the famous Dresden band of the elector of Saxony, King of Poland. In 1758, when over thirty years of age, he came to England in a state of great destitution; but his talents were quickly recognized. He was appointed chamber-musician to the queen of George III. His peculiar instrument, the *viola da gamba*, a small violoncello, with six strings, was never played by any one in equal perfection. He also obtained considerable reputation as a composer, though his works are now almost forgotten.

ABEL, SIR FREDERIC AUGUSTUS, chemist, was born in London in 1827. He devoted himself chiefly to the science of explosives, expounding his discoveries in *Gun-cotton* (1866); *The Modern History of Gunpowder*; *On Explosive Agents*; *Researches in Explosives*, and *Electricity applied to Explosive Purposes*. He wrote also, in conjunction with Colonel Bloxam, a *Handbook of Chemistry*. By converting blasting gelatine into a solid body, he produced a more powerful and manageable explosive. He was knighted in 1883.

ABEL, NIELS HENRIK, 1802-29; a Norwegian mathematician. For so short a life the extent and thoroughness of his mathematical investigations and analyses are marvelous. His powers were shown in a remarkable degree in his development of the theory of elliptic functions. Legendre's eulogy, "What a head that young Norwegian has," is the more forcible, because the French mathematician had occupied most of his lifetime with those functions. Abel's works were published by the Swedish government in 1839.

ABEL, CARL, Ph.D., philologist, b. in Berlin, Germany, Nov. 25, 1837. He studied philology, national psychology and history at the Universities of Berlin, Munich and Tübingen, but afterwards devoted himself especially to the study of language, acquiring familiarity with all European and several Oriental tongues. His study of the development of linguistic concepts led him to the conclusion that their comparison offered the best means of gauging the intellect and feelings of a race. He was lecturer on comparative Slavonic and Latin lexicography at Oxford, taught philosophical and comparative linguistics at the Humboldt Academy of Science in Berlin and was linguistic assistant in the German foreign office. He published many philological works.

ABELARD, Fr. Abélard or Abailard; Lat. *Abelardus*, **PETER**, a scholastic philosopher and theologian, the boldest thinker of the 12th c., was b. near Nantes, in 1079, at Palet, a village which belonged to his parents. An irrepressible thirst for knowledge, and a special pleasure in scholastic logic, moved him to resign his rights of primogeniture in favor of his younger brothers. He left Bretagne for Paris, in order to hear the prelections of William of Champeaux, but soon incurred the hatred of his master, whom he puzzled by his wonderful subtlety. He fled to Melun, and afterwards to Corbeil, persecuted and admired wherever he went. He then returned home for the restoration of his health. With renewed strength, he returned to Paris, reconciled himself with his opponents, and moulded, by his influence as a lecturer, some of the most distinguished men of his age, amongst whom were the future pope Celestine II.; Peter Lombard; Berengar, his future apologist; and Arnold of Brescia. At this time, there lived in Paris, Heloise, the niece of the canon Fulbert, then seventeen years of age, and already remarkable for her beauty, talents, and knowledge. She soon kindled in the breast of A., then thirty-eight years old, a violent and overwhelming passion, which was returned by Heloise with no less fervor. By means of Fulbert, A. became teacher and companion of Heloise, and the lovers were happy together until A.'s ardent poetical effusions reached the ears of the canon. He sought to separate the lovers; but it was too late. They fled together to the country, where Heloise bore a son, and was privately married to A., with the consent of her uncle. Not long after, Heloise returned to Fulbert's house, and denied the marriage, that her love might be no hindrance to A.'s advancement in the church. Enraged at this, and at a second flight which she took with her lover, Fulbert, in order to make him canonically incapable of ecclesiastical preferment, caused A. to be emasculated. In deep humiliation, A. entered as a monk the abbey of St. Denis, and induced Heloise to take the veil at Argenteuil. But the lectures which he began to give soon after exposed him to new persecutions. The synod of Soissons (1121) declared his opinions on the Trinity to be heretical. He left St. Denis, and built at Nogent-on-the-Seine a chapel and hermitage called Paraclete, which, after being enlarged by his scholars to a monastic foundation, he, on his appointment as abbot of St.-Gildas-de-Ruys, in Bretagne, gave over to Heloise and her sister-

hood for a dwelling. His residence in St. Gildas was embittered by a continued struggle against his love, and by the hatred of the monks; till at last, in 1140, his doctrine was condemned by pope Innocent III., and he was ordered to be imprisoned. But Peter the venerable, abbot of Clugny, after A. had retracted his opinions on the Trinity and redemption, reconciled him to his enemies. A. died with the reputation of a model of monastic propriety, on April 21, 1142, in the abbey of St. Marcel, not far from Chalons-on-the-Saône. Heloise had him interred at the Paraclete, hoping one day to lie by his side. She survived A. twenty years. The ashes of both were taken to Paris in 1808, and in 1828 were buried in one sepulchre in Père la Chaise.—The doctrines advanced by A. in his controversy with St. Bernhard have a decidedly rationalist tendency; and he, and his predecessor Erigena, may be looked upon as the first avowed representatives of that school. A. laid down the principle that nothing is to be believed but what has been first understood; while the church held that we must believe in order to understand; and Bernhard was for banishing inquiry altogether from the province of religion. In judging of A.'s merits, we are not to look so much to his writings as to the influence which his wonderful power of public disputation enabled him to exercise on his age. His character, no less than his doctrine, gave great offence. Until recently, it is chiefly the romantic history of his love that has occupied attention. The chief biographies that have appeared are that by Rémusat (2 v., Par. 1845), and that by Wilkens (Gött. 1855). The Latin writings and letters of A. and Heloise were collected by Amboise, and published by Duchesne (Par. 1616). Some works of A. have been recently discovered; among others, *Sic et Non*, a collection of doctrinal contradictions from the Fathers. Cousin, who published the hitherto unedited works in 1836, has given us a complete edition of A.'s works (2 v., Par. 1849-59). See Compayré, *Abélard* (N. Y., 1893).

ABELE. See **POPLAR**.

ABELITES, a Christian sect of the 4th c., found chiefly in the neighborhood of Hippo, in North Africa. Their chief distinction consisted in marrying but abstaining from matrimonial intercourse, in order not to propagate original sin. They held that Abel so lived, because the Bible mentions no children of his.

ABELMOSCHUS. See **HIBISCUS**.

ABEN. See **BEN**.

ABENA'QUIS, or **ABNAKIS**, Algonquin Indians, once occupying Maine; the Canabis, or Abenakis, on the Kennebec; the Etechenims towards the St. John; the Pennacooks of the Merrimack; and probably the Sokokes further west. The A. were friendly with the French, and assisted them in various conflicts and frays during the Canadian wars. Their best known leader was Father Râle, a Jesuit missionary; but he was killed and the tribe nearly destroyed at Norridgewock in 1724. A large portion of the A. went to Canada. The descendants of those who remained in New England are the Penobscots and the Passamaquoddys. During our revolution the A. Indians were generally on the side of the colonies. Father Râle mastered their language, and made a dictionary of it. See **ALGONQUINS**.

ABENCERRA'GES, a noble Moorish race whose struggles with the family of the Zegris, and tragical destruction in the royal palace of the Alhambra, in Granada, in the time of Abu-Hassan (1466-84), the last but one of the kings of Granada, furnish the materials for a charming Spanish work of fiction, *Historia de las Guerras Civiles de Granada* (Madrid, 1694). From this Chateaubriand composed *Les Aventures du Dernier Abencerrage*, and furnished the text of an opera of Cherubini's. The work, however, seems to be destitute of historical foundation; at least Conde is perfectly silent on the subject in his *Historia de la Dominacion de los Arabes en España* (3 v., Madrid, 1829).

ABENDBERG, a hill in the canton of Berne, rising abruptly out of the waters of lake Thun, on the s. side. It is interesting as the site of an institution, established by Dr. Guggenbühl, for the cure of cretinism (q.v.), and supported by contributions from far and near. The sanguine hopes raised as to the good to be effected by the healthiness of the situation, and the mode of treatment followed, were greatly disappointed, little alleviation being perceptible, and on the death of its founder, in 1863, the institution was closed.

ABEN-ESRA, properly Abraham-Ben-Meir-Ben-Esra, b. 1093 in Spain, d. 1168 in Rome, was one of the most learned Jews of his times. He understood the Hebrew, Arabic, and Aramaic languages; had considerable knowledge of mathematics, astronomy, and medicine; was a scientific observer; and generally distinguished himself as a sagacious thinker. Having left his native land, he visited Lombardy, Provence, France, Egypt, and England, and passed the later years of his life in Rome; everywhere giving lectures on grammar, theology, astronomy, etc., besides writing and translating several works in Hebrew and Arabic. His *Commentaries on the Old Testament* are the most important of his works, which include some treatises on astrology, since published in Latin. The scholastic writers mention Aben-Esra as **ABENARE** or **AVENARD**.

A'BENSBERG, a t. in Lower Bavaria, 18 m. s.w. of Ratisbon. It has warm springs and fine castle ruins. April 20, 1809, Napoleon here defeated the Austrians and opened the way for the victory of Eckmühl.

ABEOKUTA, a city, or rather collection of small towns or villages, capital of the territory of Egba, in the Yoruba country, on the w. coast of Africa. A. is about 80 m., by the river Ogun, n. of Lagos (on the Bight of Benin), and 240 m. w. of the Lower Niger. It is situated 567 ft. above the sea-level, on an undulating plain, fantastically broken by masses of gray granite, and covered with bush. Looking down on the city from a height, Burton says: "The scene before me wants neither grandeur nor beauty; there is a gorgeous growth around—hill, water, forest, and homestead all are present. * * * The primeval forest has been cleared away around the town, yet there is not a vestige of cultivation; and if you ask for the farms, you are told that they are distant some 5 to 20 m. The reason is that, if placed within reach, nothing could defend them from the depredations of robbers and cattle." A. is surrounded by a wall of hardened mud, from 18 to 20 m. in circumference, between 5 and 6 ft. high, without embrasure, and pierced here and there "with an aperture by way of loophole." The town itself Burton found to measure 4 m. by 2. The houses are square, and built of mud, with tall roofs of thatch; the streets are narrow and irregular, and the only scavengers are the sun, the vulture, and the pig. There are a few European traders and missionaries; the success of the latter, according to Burton, not having been extraordinary. There is a trade in palm-oil and grain. Pop. estimated at 100,000.—For further interesting details, see R. F. Burton's *Abeokuta and the Camaroons Mountains* (1863).

ABER is a Celtic word which enters into the composition of several names of places, chiefly in Wales and Scotland. It indicates the mouth or embouchure of a stream, either into the sea or into another river—as Aberbrothock, at the mouth of the Brothock, in Forfarshire; Abergavenny, at the junction of the Usk and Gavenny, in Wales.

ABERAVON, or PORT TALBOT, a parliamentary and municipal borough on the s. coast of Wales, in Glamorganshire, near the mouth of the Avon, about 30 m. w. of Cardiff. It is beautifully situated near the valley of Cwm Avon, in which are extensive mining-works belonging to the Bank of England. The town has a good harbor and docks, is a station on the South Wales Railway, and communicates regularly with Bristol by steamers. The valley of the Avon is shut in by lofty hills, while every available space is occupied by copper and iron works. Population of municipal borough 6300.

ABERBROTHWICK. See **ARBROATH**.

ABERCROMBIE, JAMES, 1706-81; a British general, b. in Scotland. He was commander-in-chief in America in 1758, and in July of that year was defeated in an attack upon Ticonderoga, losing heavily in men. He was superseded by Sir Jeffrey Amherst, who recaptured Ticonderoga and Crown Point. Returning to England he became a member of parliament and deputy-governor of Stirling Castle.

ABERCROMBIE, JOHN, in his own day the most eminent of Scottish physicians, and still worthy of remembrance for his professional and moral excellence, was born in 1780, at Aberdeen, where his father was long a parish minister. He studied medicine in Edinburgh, taking his degree in 1801, and thenceforth devoted himself to the practice of his profession in the Scottish capital. At a comparatively early age he attained a high reputation; and after the death (in 1821) of the celebrated Dr. Gregory, he became recognized as the first consulting physician in Scotland. His professional writings contributed to his celebrity, which was still further extended by the publication, in 1830 and 1833, of his works on *The Intellectual Powers* and *The Moral Feelings*. These works have no pretensions to originality or depth of thought, but acquired, from the high personal character of the author, a reputation during his life which a few years have sufficed to impair. They possess, however, the merit of being more readable than many works of the same class, and are pervaded by a moral and religious feeling which, in the case of their pious and benevolent author, was perfectly genuine. Dr. A. died suddenly, Nov. 14, 1844. Among the honors bestowed upon him during his life were the degree of M.D. from Oxford, the rectorship of Marischal college, the vice-presidency of the Royal Society of Edinburgh, and the office of physician in ordinary to her majesty for Scotland.

ABERCROMBIE, JOHN J., 1802-77, graduate of West Point, 1822. His bravery was marked in our wars with the Indians and especially in the war with Mexico. During the civil war he rose to the rank of brig.-gen. vols., and in 1865 was brevetted brig.-gen. in the regular service and retired.

ABERCROMBY, DAVID, a Scotch metaphysician, who died about 1702, of whom little is known except through his writings. He had been a Roman Catholic priest, but abjured and published his reasons in *Protestancy safer than Popery*, in 1686. His most notable work is *Discourse on Wit*, published in 1685, which has been ascribed to Patrick Abercromby and other authors. In medicine he is known through his *Noxa Medicinæ Praxis*, *De Pulsus Variatione*, and others on the effect of salivation, &c. His *Opuscula* were collected in 1687.

ABERCROMBY, SIR RALPH, was born at Menstry, in Clackmannanshire, in 1734. He was designed by his father for the Scottish bar; and studied from 1752 to 1755 at the universities of Edinburgh and Leipsic. His natural inclination, however, pointed to a military life; and in 1758 he went to Germany as a cornet in the 3d dragoon guards. In 1780 he raised a regiment in Ireland, which was called the 103d, or king's Irish. It was disbanded in 1783; and the next ten years were spent by Sir Ralph in the retirement of a country life. He had married in 1767. In 1793, he accompanied the duke of York to

Holland. His conduct throughout that unfortunate campaign, especially during the disastrous retreat in the winter of 1794-95, won him the love and admiration of the whole army. On his return to England, he was appointed to the chief command of the expedition to the West Indies, which, notwithstanding the vexatious obstruction of his designs, he conducted with distinguished success, taking Grenada, Demarara, Essequibo, St. Lucia, St. Vincent, and Trinidad. Soon after he was appointed commander of the forces in Ireland; but his enlightened and manly remonstrances against the policy of government towards that country occasioned his removal to a similar command in Scotland. In 1799, he was appointed second in command to the duke of York in the expedition to Holland, still more unhappy and ignominious in its results than the former. A. alone acquitted himself on all occasions with entire credit. On his return, he was appointed to command the expedition to the Mediterranean. The fleet anchored in Aboukir bay on the 2d of March. On the 7th, A. reconnoitred the shore in person. Before mid-day of the 8th, the British troops were in possession of the sand-hills that commanded the shore, having landed in the face of a storm of shot that ploughed the water around them. On the 13th, the enemy were driven within the lines of Alexandria. On the morning of the 21st, Menou attempted to surprise the British camp. He found them ready, under arms. In the glorious action that ensued, the British commander was struck by a musket-ball in the thigh; but not till the battle was won, and he saw the enemy retreating, did he show any sign of pain. He was borne from the field in a hammock, cheered by the blessings of the soldiers as he passed, and conveyed on board lord Keith's ship. The ball could not be extracted; mortification ensued; and Mar. 28, 1801, he died, in the sixty-eighth year of his age. In the character of A. were combined the qualities that seem peculiarly characteristic of a true British soldier. He was at once gentle and brave, clear-sighted and cool in deliberation, in action prompt and daring, even to hardihood. Apart from his qualities as a soldier, he was a man of liberal accomplishments, free from prejudices, and of sound practical judgment.—The national gratitude to this eminent man took the form of a peerage conferred on his widow, afterwards enjoyed by his eldest son, with the title of baron Abercromby.—His third son, JAMES ABERCROMBY, after being m.p. for Edinburgh and speaker of the reformed house of commons, was raised to the British peerage in 1839, with the title BARON DUNFERMLINE. He died in March, 1858.

ABERDARE, a t. in Wales, Glamorgan co., on the right bank of the Cynon, 4 m. s.w. of Merthyr-Tydvil, in a rich mineral district, having extensive coal and iron works. Tin works have recently been opened. A. is connected with the coast by a canal and railway. Its growth of late years has been remarkable. Pop., '41, 6471; in '91, 43,303.

ABERDEEN, the chief city and seaport in the n. of Scotland, lies in lat. 57° 9' n. and long. 2° 6' w., in the s.e. angle of the co. of the same name, at the mouth of the river Dee, which forms its harbor, and 111 m. n. of Edinburgh. Its mean annual temperature is 45°.8 F., and rainfall, 30.57 in. William the lion made A. a royal burgh in 1179. The English burned A. in 1336, but it was soon rebuilt, and called New Aberdeen. Old A., within the same parliamentary boundary, is a small t. a mile to the n., near the mouth of the Don. King's college and university, founded in old A. in 1494, and Marischal college and university, founded in new A. in 1593, were in 1860 united into one institution, the university of Aberdeen. It had 691 students, in 1895, and its general council with that of Glasgow university, sends one member to parliament. In the 17th c. A. had become an important place, but it suffered much from both parties in the civil wars. It has now a flourishing trade and large manufactures, and its handsome light-gray granite architecture is much admired. The harbor has been much enlarged and deepened, and at the entrance is the Girdleness Lighthouse, about 185 feet in height. The dock acreage is very extensive. The chief exports are linens, woollens, cotton-yarns, paper, combs, granite (hewn and polished), cattle, grain, preserved provisions, and fish. A. has considerable ironworks and much shipbuilding. It has a large number of churches and excellent educational advantages. The A. clipper-bow ships are celebrated as fast sailers. A. has above 60 places of worship, and 10,000 children at school. Connected with A., which has always been a celebrated seat of learning, have been the names of Barbour and Boece; bishops Elphinstone, Dunbar, and Forbes; the earls Marischal, Jameson, Gregory, Reid, Beattie, Campbell, and Hamilton. The British association met here in 1859, under the presidency of the prince consort. The burgh is governed by 25 councilors, including a provost, six bailies, a dean of guild, etc. Pop. 1895, 133,733.

ABERDEEN, t. and co. seat of Monroe co., Miss., on the Tombigbee River and the Illinois Central, Kansas City, Memphis and Binghamton and the Mobile and Ohio railroads; 232 miles by water above Mobile, Ala. It has banks, public high and grammar schools, several weekly and monthly periodicals and grist-mills, lumber-mills, and cotton-gins, and is principally engaged in the cotton trade. Pop. 1890, 3449.

ABERDEEN, city and co. seat of Brown co., South Dakota; on the Chicago and Northwestern, Chicago, Milwaukee and St. Paul, and the Great Northern railroads; 42 miles north of Redfield. It has banks, newspapers, good educational facilities, a public library and some important manufactures. It was settled in 1880-1 and incorporated in 1882. Pop. 1890, 3182.

ABERDEEN, GEORGE HAMILTON GORDON, EARL OF, was born at Edinburgh in 1784. He was educated at Harrow and at St. John's college, Cambridge, where he took his

degree of M.A. in 1804. Before this, on succeeding to the earldom in 1801, he made a tour through Greece, the record of which is preserved in Byron's well-known line—

“The traveled thane, Athenian Aberdeen.”

In his twenty-second year, he was elected one of the sixteen Scottish representative peers, and entered public life as a tory. In 1813, he was appointed ambassador to the Austrian court, and conducted the negotiations which terminated in the alliance of that power with Britain. At this time he formed that close friendship with prince Metternich which so decidedly influenced his subsequent policy as a statesman. On the conclusion of the war, he was elevated to the British peerage as viscount Gordon. From this time till the year 1828, his lordship made no prominent appearance in public life. In that year he took office in the new ministry formed under the duke of Wellington. The general principle which guided his policy, as secretary of state for foreign affairs, was that of non-interference in the internal affairs of foreign states, which, joined to his well-known sympathy with such statesmen as Metternich, has exposed him—not always justly—to the suspicion of being inimical to the cause of popular liberty. His gradual abandonment of high tory principles was evinced by his support of the bill for the repeal of the test and corporation acts, and of the Roman Catholic emancipation act. From the fall of the Wellington ministry till the Peel administration in 1841, his lordship was out of office, with the exception of his brief administration of the colonial office in the tory ministry of 1834-5. In 1841, he again received the seals of the foreign office. M. Guizot was at that time foreign minister in France, and the two statesmen acted in cordial alliance. The conclusion of the Chinese war, the Ashburton treaty, and the Oregon treaty, were the principal services rendered to the country during his administration of foreign affairs. His act in 1843 for removing doubts regarding the admission of ministers to benefices in Scotland, neither saved the disruption of the church nor pleased those for whom it was meant, and is now virtually repealed by the “act for the abolition of patronage” (1874). From the time that the repeal of the corn-laws became the rallying-point of the Peel party, he became identified with their policy. In 1846, he resigned with Sir Robert Peel. In 1853, on the resignation of lord Derby, the extraordinary state of parties necessitated a coalition, and lord A. was selected as the fittest man to head the new ministry, which for some time was extremely popular. The feeble and vacillating policy displayed in the conduct of the war with Russia gradually undermined its stability, and the disastrous mismanagement brought to light in the winter of 1854, in all departments of the public business connected with the war, filled up the measure of the popular discontent. On Feb. 1, 1855, lord A. resigned office. He died in 1860. See Gordon, *Earl of Aberdeen* (1893). His grandson, JOHN CAMPBELL HAMILTON GORDON, became governor general of Canada in 1893.

ABERDEENSHIRE, a large maritime co. in the e. of Scotland, between 56° 52' and 57° 42' n. lat., and 1° 49' and 3° 48' w. long.; bounded n. by Banffshire and the North sea; e. by the North sea; s. by Kincardine, Forfar, and Perth shires; w. by Inverness and Banff shires. It is the fifth in size of the Scottish counties; greatest length, 102 m.; greatest breadth, 50 m.; with 60 m. of sea-coast, and an area of 1955 sq.m. It has long been popularly divided into five districts (proceeding from s.w. to n.e.)—Mar, Strathbogie, Garioch, Formartin, and Buchan. A. is generally hilly, and in the s.w. (Braemar) entirely mountainous, the Grampians running along the s. side, and branching off to the n.e. and n. Braemar contains the highest mountains: Ben-Muic-Dhui (next to Ben Nevis, the highest hill in the British isles), 4296 feet; Cairntoul, 4245; Cairngorm, 4083; Ben-na-Buird, 3860; Lochnagar, 3770. The predominant rocks are granite and gneiss. The granite is very durable, and is much used for building and polishing. The chief rivers are the Dee (96 m. long), Don (78 m.), and Ythan (37 m.), which run eastward into the North sea; and the Doveran (58 m.), which runs n.e. into the North sea (see DEE, DON, DOVERAN). On the upper part of the Dee is *Balmoral* (q.v.). The Ythan yields the pearl-mussel, but rarely pearls of any value. The mean annual rainfall of A. varies from 30 to 37 in. Clay soils predominate near the coast, loamy soils near the centre, and poor, gravelly, sandy, and peaty soils elsewhere. The most fertile parts lie between the Don and Ythan, and in the n.e. angle of the co. Nowhere in the kingdom have the natural disadvantages of soil and climate been more successfully overcome. A. has 188 m. of railway, and 2359 m. of public roads, the latter supported by rates, and not by tolls. The chief towns and villages are Aberdeen (new and old), Peterhead, Fraserburgh, Huntly, Kintore, Inverurie, and Turriff. The co. returns two members to parliament; the city of Aberdeen, one; and the burghs of Peterhead, Kintore, and Inverurie, with Elgin, Cullen, and Banff, one. About 37 per cent. of the area of A. is cultivated. Aberdeenshire produces large crops of hay, oats, turnips, barley and potatoes, and is unsurpassed in breeding and feeding stock. The fisheries on the coast are very productive. Pop. in '91, 284,036; with 49,185 inhabited houses, and above 80 per cent. of the children, of ages 5 to 13, receiving education. The munificent Dick and Milne bequests for parochial schoolmasters have given A. a high place in the statistics of education; and in proportion to its population the number of its places of worship is very large.

ABERDEVINE, or *SISKIN*, *fringilla spinus*, a song-bird, nearly allied to the goldfinch, with which it is placed by Cuvier and others in the new genus *carduelis*. It is rather smaller than the goldfinch, and less elongated in form. The crown of the head

and the throat are black, the nape dusky green, and there is a broad yellow streak above and behind each eye. It is only a winter visitant of Britain, and breeds in the n. of Europe, building its nest in high trees. It is frequently kept as a cage-bird, being easily tamed, and breeds freely with the canary. It feeds on the seeds of the thistle, alder, birch, and elm, and occasionally does great damage to the hop plantations in Germany. In France it injures the blossoms of the apple trees.

ABERGAVENNY, the Roman *Gobanium*, a market t. of England, in Monmouthshire, 13 m. w. of Monmouth, is beautifully situated in the valley of the Usk, the garden of Wales, at the junction of the Usk and Gavenny, and is surrounded on every side by high mountains and thick woods. The town is regularly and compactly built, and many improvements have of late years been made. St. Mary's church, which was once a fine cruciform structure, and contains many interesting monuments, has been spoiled by alterations. The castle, which is very ancient, is now a ruin. The principal modern building is the lunatic asylum. There are collieries and iron-works in the neighborhood. Pop. '91, 7640.

ABERNETHY, JOHN, 1680-1740; b. Coleraine, Ireland; a dissenting minister, son of a dissenter. He was educated at Glasgow and Edinburgh, and licensed to preach before the age of 21. He was ordained at Antrim in 1703; in 1717 he was invited to a congregation in Dublin, as colleague of Rev. Mr. Arbuckle, but he declined and remained at Antrim. This refusal was considered ecclesiastical rebellion, and a fierce controversy ensued, the parties dividing into "subscribers" and "non-subscribers." Though himself strictly evangelical, A. and his associates were remotely the occasion of the contest which ended in eliminating Arian and Socinian elements from the Irish Presbyterian church. In 1726, A. and all the "non-subscribers" were turned out with due ban and solemnity. Yet only four years afterwards he was called to a "regular" congregation in Dublin. In 1731, in the controversy regarding the test act, A. took broad ground "against all laws that, upon account of mere differences of religious opinions and forms of worship, excluded men of integrity and ability from serving their country." He was a century ahead of the time, having to argue against those who denied that a Roman Catholic or a dissenter could be a "man of integrity and ability." A. was foremost where unpopular truth and right were to be maintained, and his *Tracts*, collected after his death, did good service for generations.

ABERNETHY, JOHN, a very eminent English surgeon, was born in London in 1764. His grandfather was the Rev. John Abernethy, an Irish Presbyterian clergyman, who acquired distinction by his writings, and his bold adoption of bishop Hoadly's views on the right of private judgment and the subscription of confessions. A.'s early tastes disposed him to the bar; but in 1780 he was apprenticed to Mr. (afterwards Sir Charles) Blicke, surgeon of St. Bartholomew's hospital. He attended at the same time the lectures of John Hunter and Sir W. Blizard. In 1787, A. was elected assistant-surgeon to St. Bartholomew's, an office which he filled for twenty-eight years; at the end of which time he was appointed surgeon, with a salary. Soon after his election, he began to lecture in the hospital on anatomy and surgery, and may be said to have laid the foundation of its character as a school of surgery. At first, he manifested extraordinary diffidence, but his power soon developed itself; and his lectures at last attracted such crowds, that, in 1790, it was found necessary to build a lecture-theatre in the hospital for his use. His clear, simple, and positive style, illustrated by an inexhaustible variety of apt anecdotes, made him the most popular medical teacher of his day. In 1813, he was appointed surgeon to Christ's hospital, and in 1814, professor of anatomy and surgery to the college of surgeons. His practice increased with his celebrity, which the singular eccentricity and occasional rudeness of his manners contributed to heighten. Notwithstanding, however, the irritability and harshness which he so often exhibited, those who knew him best bear unanimous testimony to the generosity and kindliness of his character. He married in 1800, and had several children. He died at Enfield, in 1831. Of his works, the most original and important is his *Observations on the Constitutional Origin and Treatment of Local Diseases*, first published in 1806, in which a simple principle, till then little attended to, was made the foundation of much important and ingenious observation. His *Lectures on the Theory and Practice of Surgery* were published in 1830.

ABERRATION OF LIGHT is an apparent alteration in the place of a star, arising from the motion of the earth in its orbit combined with the progressive passage of light. When rain is falling perpendicularly, a drop entering at the top of an upright tube at rest, will go through; but if the tube be carried forward horizontally, a drop entering the top will strike against the side before it goes far; and to make the drop go through the tube in motion, we must incline the top of it forward in the direction of the motion. The amount of this inclination will be the greater the more rapid the motion of the tube is compared with that of the falling drops. If in the time that a drop takes to fall through the height AB of the parallelogram in the annexed cut, the inclined tube BC is moved horizontally over a space equal to its breadth, AC, a drop entering the top of the tube will descend without touching the sides. For in half the time the tube will be in the position B'C', and the drop in the position *d*; and so for any other portion of the time. This exactly illustrates the astronomical phenomenon in question. The tube is a telescope directed to receive the light of a star; this tube, and the person looking

through it, are moving along with the earth in its orbit, and the light may be conceived as particles coming from the star like drops of rain, moving much faster, no doubt, still requiring time. That a particle or ray of light from the star may pass through the tube, it must be directed, not straight to the star, but at a slight angle in the direction of the earth's motion. Thus the place where we see the star is not its true place. As the earth's motion, however, is slow compared with the velocity of light, the angle of inclination is small—never exceeding about $20'$. The result is, that, if we conceive the true place of a star as a fixed point, the apparent place of the star describes about this true place, in the course of a year, an ellipse whose greater axis is about $40'$. The aberration of light was discovered by the English astronomer Bradley, in 1727, while seeking to determine the parallax of certain fixed stars.



AB'ERT, JOHN JAMES, 1788-1863; an American military engineer. He was educated at West Point; resigned on graduation and practiced law. He served as a private in the battle of Bladensburg, Aug. 24, 1814. In 1829, he was lt.-col. in command of the engineers and head of the topographical bureau. In 1832-33 he was commissioner for Indian affairs, and in 1838 made col. of the corps of engineers, having charge of the topographical service of the government until his retirement, Sept. 9, 1861.

ABERYST'WITH, a seaport of Wales, and till 1885 one of the Cardigan districts of parliamentary boroughs. A. is the seat of the univ. coll. of Wales (1872), is much resorted to for sea-bathing, and is well provided with good hotels and lodging-houses. Pop. 1881, 6664; '91, 9424.

ABES SA, a damsel in Spenser's poems, impersonating abbeys and convents. When Una asked if she had seen the red cross knight, A., frightened at the lion, ran into the house of Blind Superstition, and closed the door, which the lion broke open. The meaning is, that when Truth came, the abbeys and convents were alarmed and barred her out, but England (the lion) broke in the door.

ABEY'ANCE, a legal term importing that a freehold inheritance, dignity, or office is not vested in any one, but is in expectation, or suspended, until the true owner appears, or the right thereto is determined. Titles of honor are said to be in A. when it is uncertain who shall enjoy them.

AB'GAR, the title of a line of kings of Edessa, in Mesopotamia. One of them is known from a correspondence which he is said to have had with Jesus Christ. A letter of A. entreating Jesus to come and heal him of disease, and offering him an asylum from the wrath of the Jews, together with the answer of Jesus, promising to send a disciple to heal A. after his ascension, are given by Eusebius, who professed to believe the documents to be genuine. The same opinion has been held by scholars here and there, and by many unlettered persons down to our own times; but there can be no reasonable doubt that the whole correspondence is fabulous. It has also been stated that A. possessed a picture of Jesus, and the credulous may still find such a picture either in Rome or Genoa. Still others report A. as the possessor of the handkerchief which a woman gave Jesus to wipe the sweat from his brow as he toiled under the weight of his cross, and say that the features of the Savior are miraculously imprinted thereon.

ABHORRERS, the supporters of Charles II. in his policy of discouraging petitions for the reassembling of Parliament (1680). The plan of the king's adversaries for presenting these petitions from every part of the kingdom was checked by a royal proclamation indicating the king's displeasure and encouraging the magistrates to treat them as seditious. Many Tory addresses followed, expressing confidence in the king and *abhorrence* of the petitions. This became the watchword of the party, while the opposing whigs were termed *Petitioners*.

A'BIAD, **BAHR-EL-**, the "White Nile," the western branch of the Nile above Khartoum. See NILE.

ABI'ATHAR, a Jewish high priest; son of Ahimilech, slain by Saul for receiving the fugitive David, to whom Abiathar adhered, especially during Absalom's rebellion. For taking part in the rebellion of Adonijah, A. was deprived of his priesthood by Solomon, and banished.

A'BIB, the first month of the Jewish ecclesiastical year, and the seventh of the civil year; also called Nisan. It is rather a name for the season when new grain appears than for a month. According to the rabbins it began with the new moon of March.

A'BICH, WILHELM HERMANN, b. Berlin, Dec. 11, 1806; a German naturalist. He graduated in 1831, and in 1842 became professor of mineralogy in the university of Dorpat, and in 1853 member of St. Petersburg academy of sciences. Abich explored the Caucasus, Russian Armenia, northern Persia and Daghestan, and published several books on the geology, etc., of those regions. He d. 1886.

ABIES. See FIR.

ABIGAIL is a general name for a waiting-maid or a lady's-maid. Some suppose the name to refer to Abigail Hill, afterwards Mrs. Masham, a maid of honor and a great favorite of Queen Anne. Others think the name refers to Abigail, wife of Nabal, a wealthy chief, who refused common hospitality to David when he fled from Saul. David afterwards determined to punish Nabal, but Abigail went out to meet him with a present, and made herself so charming that, on the death of her husband, not long after, David made her his wife. In her address to David, when she first meets him, she styles herself a *handmaid*.

ABILENE. The seat of justice of Dickinson Co., Kan., on the Union Pacific and two other railroads. It has shops, churches, banks and newspapers, graded public schools and a Roman Catholic college for young ladies. Pop. '90, 3547.

ABIM'ELECH, a son of Gideon. When his father refused to take the title of king, either for himself or children, A. set out to claim the sovereignty, slew seventy of his brothers, and was declared king. Three years afterwards the Shechemites made an unsuccessful attempt to throw off his rule. After destroying Shechem, A. went against Thebez, which had revolted, and here, while storming the place, was struck on the head by a piece of millstone thrown from the wall by a woman. To avoid an ignominious death, he ordered his sword-bearer to run him through. His reign is regarded as the first attempt to establish a monarchy in Israel.

ABIM'ELECH, a Philistine king, to whom Abraham represented Sarah to be his sister, and not his wife. Upon Abimelech soliciting her company, the fraud was exposed.

ABINGDON, a city in Knox co., Ill., incorporated in 1857, on the line of the Chicago, Burlington and Quincy and the Iowa Central railroads; 85 m. n. e. of Quincy. It is the seat of the Hedding Methodist Episcopal College, and has churches, banks, newspapers, and several flourishing industries. Pop. '90, 1321.

ABINGDON, town and co. seat of Washington co., Va., on the Norfolk and Western railroad; is the seat of the Martha Washington College and the Stonewall Jackson Institute (both for young ladies); has cigar factories, flour and planing mills, and other industries. Pop. 1890, 1674.

ABINGDON, a market t. in Berkshire, England, situated at the junction of the Ock and the Thames. The name was originally Abbendon (town of the Abbey). It sends a member to parliament. Pop. of parliamentary borough '81, 6608; '91, 6557.

ABINGTON, a town in Plymouth co., Mass., 20 m. s. e. of Boston, on the New York, New Haven and Hartford railroad; pop. '90, 4244. It has high and graded public schools, a public library, and manufactures of boots and shoes.

ABINGTON, FRANCES, b. 1737, d. London, Mar. 4, 1815; a famous English actress, daughter of Barton, a common soldier. As an errand-girl, she picked up French from a milliner. She became a flower-girl around theatres, and made her first appearance at the Haymarket as "Miranda," in "The Busybody," soon after marrying Abington, her music master, from whom she separated. She was a favorite in Dublin, opening with "Kitty," in "High Life Below Stairs," for Tate Wilkinson's benefit, who gives an animated picture of her success. The headdress she wore was adopted by the women of fashion, and the "Abington cap" became famous. Returning to England in 1765, she was warmly received by Garrick. After the retirement of Mrs. Pritchard and Kitty Clive she had no rivals on the London stage, and became the first comic actress of the period, appearing last, April 12, 1799. She left legacies to the theatrical funds.

ABIOGENESIS (see GENERATION, SPONTANEOUS), the name for the supposed production of living matter from non-living; one of the fundamental and oldest questions in biology; recently much studied because of more accurate means of experiment, and partly because of its important bearing on evolution, correlation of forces, and the theory of infectious diseases. Though the doctrine of A. may not be said to be either established or refuted, we can believe in gradual progress towards a solution. The defenders of A., while interpreting the results of past observations in their favor, are less disposed to rest on these, preferring to argue from such wide analogies of evolution and correlation as seem to support their doctrines. Haeckel embraces A. as a necessary and integral part of the theory of universal evolution; and Huxley, from the other side, confesses that if it were given to him to look beyond the abyss of geologically recorded time to the more remote period when the earth was passing through early physical and chemical conditions, he should expect to be a witness of the evolution of living protoplasm from non-living matter. Thus it is not so much on the ground of fact and experiment that abiogenists are convinced of the truth of their doctrine as because it seems to gain confirmation from a much wider scope: because it aids the theory of evolution by tracing organic into inorganic matter; because it fosters the increasing unpopularity of the hypothesis of a special vital force; because it would well agree with the principle of uniformity, and by disclosing the existence of unknown worlds of material for development would relieve natural selection from the immense labor of evolving all species from one or a very few primary forms. See LIFE, MATERIALISM.

ABIPONES, a small tribe of South American Indians, living in the Gran Chaco in the Argentine Republic. They are tall and active, good swimmers and hunters. Frequent wars have reduced their numbers to a few scores.

ABKHA'SIA, or **ABASIA**, a former district of Asiatic Russia on the Black Sea, bet. 42° 30' and 44° 45' n. and 37° 3, and 40° 36' e.; separated by high mountains from Circassia; bounded on the s. by Mingrelia, and s. w. by the Black sea. It nearly coincides with the present district of Sukhum. It derives its name from the Abasians or Abazians. The country is mountainous, with well watered valleys and mild climate. Some of the inhabitants till the soil, some raise cattle and horses, and some are pirates and robbers. There still continues a considerable trade in slaves. This country was subdued by the emperor Justinian, who introduced the Christian religion. Since then, Persia, Georgia, and Turkey have ruled; the latter expelling Christianity and establishing Moslemism. By the treaty of Adrianople, Russia obtained the fortresses in the territory, but until the insurrection in 1866 the native chiefs had almost unlimited power. The chief town in this region is Sukhumkaleh.

ABLATIVE CASE. See **DECLENSION**.

ABLEGATE (Latin, *ab-legatus*), a papal envoy or emissary, a special commissioner, deputed by the court of Rome to carry the hat and red bonnet to a newly appointed cardinal. His official duties are completed when the latter has received the insignia of his office. The so-called *apostolic* ablegates are of higher rank than those termed *pontifical*.

ABLUTION. See **PURIFICATION**.

ABLUTION, a symbol of purification, as when Aaron and his sons were dedicated to the priestly office. A. was required of all the Israelites as a preparation for receiving the law at Mt. Sinai. It was a religious custom with other nations also, particularly for those to be inducted into the mysteries of Eleusis. Priests among the Hebrews were required to wash their hands and feet before approaching the sacred altar; and in the early Christian church, officiating ministers laved their hands in view of the people immediately before the communion services. Among the Egyptians A. was carried to great excess. Herodotus says their priests shaved the entire body once in three days, so that no unclean thing should be upon them in the time of worship, and that they bathed in cold water twice in the night and twice in the day time. Mohammedans, both priest and lay, are noted for their frequent washings. The law of Moses directed A. for physical defilements also, and specified periods when uncleanness should cease. This, too, is a Moslem practice. A. was a sign of a declaration of innocence, and in the case of one found slain, the murderer being unknown, the rulers of the city sacrificed a heifer, and the nearest of kin of the person slain washed their hands over the sacrifice, declaring, "Our hands have not shed this blood; neither have our eyes seen it." Pilate's hand-washing has been thought to be prompted by the Hebrew custom; but such A. was the custom on many occasions among the Romans and Greeks. The Pharisees were so excessive in A. that they were rebuked for the hypocrisy of it. They had rules so exact that one could scarcely rise up or sit down without some infraction of them. They extended A. to inanimate objects also, requiring the cleansing (ceremonially, not merely for cleanliness) of pots, dishes, tables, etc. A. is a ritualistic term in the Roman Catholic service for the use of wine and water after the eucharist, to cleanse the cup and the fingers of priests. The Greek church has A. as a ceremony seven days after baptism.

AB'NER, the son of Ner, and cousin of Saul, and commander of his army. After Saul's death, the tribe of Judah recognized David, while Abner prevailed upon the other tribes to recognize Saul's son, Ishbosheth. David sent his army, under Joab, into the field, and A. was defeated. In his flight, A. being hotly pursued by Asahel, turned and slew him. According to usage, Joab, as next of kin to Asahel, became the avenger of blood. Afterwards A. went over to David, who promised to make him chief of the armies on the reunion of the two kingdoms; but A. was killed by Joab and his brother Abishai.

ABO (pronounced *Obo*), the chief t. of the government of Abo, in Finland, now belonging to the Russian empire, is situated on the river Aurajokki, near its embouchure in the gulf of Bothnia; pop. '91, 32,184. The town was founded by the Swedes in 1157, and remained the capital of Finland until 1819. In the year 1837 a great part of the town, including the university buildings, was destroyed by fire, and consequently the university was removed to Helsingfors, now the capital.—The *Peace of Abo* (1743), between Sweden and Russia, put an end to the war commenced by Sweden, under French instigation, in 1741.

A BO-BJÖRNEBORG, a department of Finland, on the gulfs of Finland and Bothnia; 9450 sq.m. It has general commerce, ship-building, and government factories. Pop. '90, 395,474; chief t., Abo.

ABOLITIONISTS, a term used to designate a party in the U. S., who sought the immediate and total abolition of slavery. See **SLAVERY**. Abolitionist views had long been held by many, especially by members of the society of Friends; but the term was not commonly used until an aggressive party spread from New England throughout the north and west, demanding immediate and unconditional emancipation. After about 30 years of agitation, the A. became sufficiently powerful to get some of their doctrines adopted by the republican party. The ends of the A. were gained when, under Lincoln's administration, slavery was abolished, Jan. 1, 1863.

ABOMA'SUM, the fourth stomach of ruminating animals, or the *rennet*. From the omasum the food is deposited in the A., a cavity considerably larger than either the second or third stomach, although smaller than the first one. The A. is that part of the digestive apparatus which is analogous to the single stomach of other mammalia, as the food there undergoes the process of chymification, after being macerated and ground in the first three stomachs.

ABOMEY, the capital of Dahomey, West Africa; 7° n. 2° 4' e.; about 60 m. n. of Whydah, the port of the kingdom. A. is a clay-built town, surrounded by mud-built walls and a moat, and is spread over a large area, some of which is under cultivation. The houses stand far apart; there are no regular streets, and the town is very dirty. There are four market places for trade in palm-oil, ivory and gold, the business being done by Mohammedan traders. In A. is the palace of the king of Dahomey, which has often been the scene of human sacrifices. There was a "custom" (sacrifice) held annually at which many criminals and war-captives were slaughtered; and whenever a king died there was a "grand custom" at which as many as 2000 men and women have been butchered. The slave trade prospered until the town was taken by a French army under Gen. Dodds in 1892, and the king overthrown. See DAHOMEY.

ABOMINATION OF DESOLATION, possibly, the Roman standard, set up in the temple of Jerusalem, to which the soldiery offered sacrifices as to an idol.

ABORIGINES (Lat.), properly the earliest inhabitants of a country. The corresponding term used by the Greeks was *autochthones*. The Roman and Greek historians, however, apply the name to a special people, who, according to tradition, had their original seats in the mountains about Reate, now Rieti; but, being driven out by the Sabines, descended into Latium, and, in conjunction with a tribe of Pelasgi, subdued or expelled thence the Siculi, and occupied the country. The A. then disappear as a distinct people, they and their allies the Pelasgi having taken the name of Latini. The non-Pelasgic element of the Roman population is supposed to represent these A., who would thus belong to the Oscans or Ausonians.

ABORTION is the term used in medicine to denote the expulsion of the product of conception (the impregnated ovum) from the womb before the sixth month of pregnancy. If the expulsion takes place after that date, and before the proper time, it is termed a *premature labor* or *miscarriage*. In law no such distinction is made. The frequency of abortion as compared with normal pregnancy is very differently estimated by different writers; but the best evidence leads us to the belief that abortion is of far more common occurrence than is generally supposed, and that it takes place on an average in one out of every three or four cases of pregnancy. The following are amongst the *causes predisposing* to this accident: (1) A diseased condition of either parent, and especially a syphilitic taint. (2) A peculiar temperament on the part of the mother. Those women who present a strongly marked nervous or sanguine temperament seem to abort with singular facility; and the same tendency is observed in those in whom the catamenial or monthly discharge is abundant or excessive. Again, very fat women, while they have a tendency to sterility, are liable to abort when pregnancy does occur. Any cause interfering with the normal oxidation of the blood—as, for instance, the constant breathing of impure air, may provoke abortion—a fact excellently illustrated by the experiments of Brown-Séquard on pregnant animals (rabbits), when he showed that the application of a ligature to the windpipe excited uterine contractions, ending, if the experiment were continued long enough, in abortion, but ceasing if air was freely admitted into the lungs. Change of climate, as from India to England, certainly predisposes to this accident; and it has been observed by various writers that great political events, the horrors of war, and famine, exert a similar action. The marvellous events that occurred in Paris in 1848 were speedily followed by an extraordinary number of abortions and of still-born children; and a similar fact had been previously noticed by the elder Nagele and Hoffmann during the famine of 1816 and during the siege of Leyden. Nor can there be a doubt that, amongst the causes predisposing to abortion, must be included the employment of such corsets and other garments as by their tightness interfere with the circulation of the blood, and alter the natural position of the womb and of the abdominal viscera. Many diseases supervening during the course of pregnancy, especially the eruptive fevers (as small-pox, scarlatina, etc.), almost invariably lead to abortion of a very dangerous character; and it has been known from the time of Hippocrates that intermittent fevers have this effect. Amongst the *direct causes* of abortion may be placed blows on the abdomen, falls, any violent muscular efforts, too long a walk or ride on horseback (indeed, women with a tendency to abort should avoid horseback during pregnancy), a severe mental shock, etc. Moreover, the death of the fetus from any cause is sure to occasion abortion.

The *symptoms* of abortion vary according to the stage of pregnancy at which it is threatened, and according to the exciting cause. Many of these resemble those of congestion of the womb, such as a sensation of weight or painful pressure in the region of the loins or sacrum, extending to the bladder and rectum (with or without tenesmus, q.v.); these symptoms being aggravated by standing or walking, and being accompanied by chills, accelerated pulse, loss of appetite, and a general feeling of discomfort. A discharge of serous fluid, sometimes slightly tinged with blood, is then observed. The feeling of weight is replaced by pains, leading to the expulsion of the ovum, which, during

the first two months, is so small as commonly to escape detection. In more advanced stages of pregnancy, the pains are more severe, the discharge is more abundant, and consists chiefly of blood; and after more or less time, the product of conception escapes either in whole or in part. In the former case, the patient has little further trouble; in the latter, hemorrhage will probably continue, and the parts retained may putrefy, and give rise to serious symptoms. After about the commencement of the fourth month, the symptoms gradually approximate to those presented in ordinary parturition.

In the treatment of abortion, prophylactics (or the guarding against causes likely to lead to it) hold the first place. Women liable to this affection should, on the slightest threatening, assume as much as possible the horizontal position, avoiding all bodily exertion or mental excitement. They should use non-stimulating foods and drinks, and keep the bowels open by gentle aperients—such as manna and castor-oil, and carefully avoid aloes and other medicines irritating the lower bowel. Moreover, a separate bedroom must be insisted on by the physician. We shall only enter into the curative treatment so far as to state that if it is deemed necessary to check hemorrhage before professional aid can be called in, cloths soaked in cold water may be applied locally (care being taken to change them before they grow warm), and iced water containing an astringent, such as a little alum, may be given internally. Further proceedings must be left to the medical attendant.

There are occasional cases (as where the outlet of the pelvis is very contracted) in which it is necessary to induce abortion by professional means, but it would be out of place to enter into this subject in these pages. It cannot be too generally known that all attempts at procuring criminal abortion, either by the administration of powerful drugs or the application of instruments, are accompanied with extreme danger to the pregnant woman.

It cannot be too earnestly impressed upon the mind of those who are tempted to procure a criminal abortion by means of drugs, that the danger of causing death is very serious. Many so-called emmenagogues (q.v.) which induce the menstrual flow in a woman who is not pregnant, but is merely suffering from *Amenorrhœa* or suppression of the menses, are abortifacients only when given in such doses as to endanger life, or to set up violent internal inflammations. Among these are the various preparations of ergot of rye (q.v.) savin (the most powerful of all emmenagogues), borax, rue, tansy, cantharides, etc. At the South, among the ignorant negroes, concoctions of pennyroyal are used for the same purpose. The milder emmenagogues, such as iron, aloes, etc., have no abortive tendency, except in the case of those women who are predisposed to abort. Violent purgatives in cases where they have caused abortion, have not done so because they directly exercise an ecbotic effect on the uterus, but only as a secondary consequence of the excessive intestinal irritation which they cause.

In the United States statutes vary in defining abortion, but the latest of N. Y. may serve as a sample of the tenor of legislation. They are (Rev. Stat., part iv., chap. i., title 2, sec. 9-12): Any person administering, prescribing, advising, or procuring to take by a woman with child any drug or thing whatever, or advising or procuring her to submit to operation with intent to procure miscarriage, unless necessary to preserve her life, shall, if the woman or child die through such means, be guilty of manslaughter in the second degree, punishable not less than four nor more than twenty years in state prison. A pregnant woman voluntarily causing abortion, except to preserve her life, suffers four to ten years. The sale of drugs and instruments for such purpose is criminal, whether to a woman pregnant or not: and the latest law makes the advertising of such medicines or instruments a misdemeanor. Convictions for actual criminal abortion, however, are rare, as it is, naturally, one of the most secret of crimes, and among the most difficult to prove.

ABOUKIR', the ancient *Canopus*, is now an insignificant village on the coast of Egypt, about 13 m. n.e. of Alexandria. The castle of Aboukir stands on the w. side of the bay of the same name. This bay is celebrated on account of Nelson's victory here gained over the French fleet, Aug. 1, 1798. The French fleet was stationed in a curved line near a small island guarded by a battery; but Nelson, with his usual intrepidity, forced a passage with half of his fleet of fifteen vessels between the island and the French line of battle, while the other half attacked the enemy in front. The French admiral De Brueys was killed by a cannon-ball, and his flag-ship, *L'Orient*, was destroyed. Napoleon defeated the Arabs here in 1799, and Sir Ralph Abercromby (q. v.) repulsed the French near this point in 1801. The French fleet was completely defeated, and only two vessels escaped.

ABOUSAM'BUL, or **IPSAM'BUL**, a place on the left bank of the Nile, in Nubia, lat. 22° 22', the site of two very remarkable rock-cut temples, perhaps the oldest existing specimens of architecture in the world. The larger temple contains fourteen apartments, hewn out of the solid rock. The first and largest of these is 57 ft. long, and 52 broad, and is supported by two rows of massy square pillars (four in each row), 30 ft. high. To each of the pillars is attached a standing colossus, reaching to the roof, overlaid with a kind of stucco, and painted with gaudy colors. In front of the temple are four colossal seated figures—the largest pieces of Egyptian sculpture yet discovered. Reproductions of two of these, on the scale of the original (65 ft. in height), form very striking objects in the Crystal Palace at Sydenham, where also may be seen a fac-simile, on a small scale,

of the temple itself. These figures are supposed to represent Rameses the great (or Sesostris), whose achievements are described on the painted walls of the temple.

ABOUT, EDMOND FRANÇOIS VALENTIN, an eminent French novelist, dramatist, and journalist, was born at Dieuze, on the 14th Feb., 1828. He studied first at the Lycée Charlemagne, where he greatly distinguished himself; and afterwards at the École Normale. In the beginning of 1852, he received an appointment to the French school at Athens, an institution supported by the French government, with no very definite object, but with the hope that the members, who are selected on account of their attainments and promise in scholarship, and left perfectly free to choose their own studies, should be able to make contributions to the history or the archæology of Greece. A. remained at Athens for about two years. He wrote, as required by the terms of his appointment, a memoir for the academy of inspections, entitled *L'Île d'Égine*; but it was as the satirist of modern Greece, not as the investigator of Grecian antiquities, that his name first became familiar to the public. On his return to France, towards the end of 1853, he published *La Grèce Contemporaine*, a work which at once attained to great popularity, and was in course of the following year translated into several foreign languages. This work, full of lively and pointed sketches, abounding in shrewd and witty observation, its censures, very severe as they were, scarcely seeming offensive, from the ease and perfect good-humor with which they were conveyed, at once made its author be regarded as among the most promising writers of the day. It unquestionably affected European opinion as to the character and the capabilities of the modern Greek; the truthfulness of its portraiture being confirmed by all who had special knowledge of this people. It gave earnest of the qualities which go to making a brilliant novelist; and A. did not long delay to come before the public as a novelist. His first novel, *Tolla*, appeared in the *Revue des Deux Mondes*, and was republished early in 1855. It did not disappoint the high expectations formed of it; but the author had laid himself open to a charge which, whenever it can be colorably sustained, is certain to be disastrous. He had taken many of his leading incidents from an Italian work, *Vittoria Savorelli*, published in 1841, and soon after withdrawn, the incidents contained in which were well known as actual occurrences; and, though something of this was hinted in the book, there was no distinct acknowledgment of it. A hue and cry of plagiarism was got up against A., from which his reputation took sometime to recover. His comedy, *Guillery*, brought out in Feb. 1856, at the Théâtre Français, did not make his peace with the Parisians; it was a complete failure, so far as the theatre-going public was concerned, and had to be withdrawn after two representations. A set of stories which he now began to contribute to the *Moniteur*, however—*Les Mariages de Paris*—placed him high in public favor; and after that time his career was a series of successes. *Les Mariages de Paris* was followed by *Le Roi des Montagnes* (1856), *Germaine* (1857), *Les Echasses de Maître Pierre* (1857), *L'Homme à l'Oreille Cassée* (*The Man with the Broken Ear*) (1861), trans. into Eng., *Le Turco* (1866), *L'Infâme* (1867) *Les Mariages de Province* (1868).

In 1859, after a tour in Italy, of a portion of which he contributed a description to the *Moniteur*, A. published a political pamphlet—*La Question Romaine*—which, displaying the same qualities as his early work on Greece, but matured, and wielded for a definite object, and being, moreover, regarded as written with the approval of the emperor of the French, created a sensation throughout Europe. His object was to expose the abuses of the ecclesiastical government at Rome; and numerous answers to his work were made by friends of the papacy. In the following year, he published two political pamphlets, *La Nouvelle Carte d'Europe*, and *La Prusse en 1860*; both of which, being taken as indicative of the emperor Napoleon's leanings, underwent criticism in all parts of Europe. A second work on Rome—*Rome Contemporaine*—appeared in 1861. About was decorated with the Legion of Honor in 1858.

The novels produced in his later years were received with unabated popularity; and he also wrote several slight dramatic pieces, which were favorably received. It is unnecessary to put down a catalogue of works which are perfectly familiar to those who are interested in French contemporary fiction. In 1864, he published *Le Progrès*, a work of considerable pretensions, in which he discussed at great length, but with his usual liveliness of style, the existing state of society, especially in France, and the methods of improving it. His conclusion was that in France there were needed for progress the liberty of association (for the purposes of production and trade), an amendment of the land-system, a proper distribution of population as between country and town, the absence of police interference in the affairs of private persons, freedom of religious worship, and other similar conditions. In 1868, A. became a leading contributor to the *Gaulois* newspaper. At the outbreak of the Franco-German war in 1870, he accompanied the army of MacMahon to Alsace as special correspondent of the *Soir*, and in 1872 he became editor of *Le XIX^{me} Siècle*. He published *Alsace* in 1872. In the same year he suffered a week's imprisonment, from the Germans, who chose to consider him, as a native of Lorraine, a German subject. He was elected a member of the Academy in 1884. He d. 1885.

ABRACADABRA, a word said to be of Persian origin, and to designate in that language Mithra, the sun-god. It was, in former times, the most venerated of those magical formulas that were constructed out of the letters of the alphabet, and was supposed to be highly efficacious for the cure of fevers, and especially quartan and semi-tertian agues.

Serenus Sammonicus gives the following directions for its use: Write the letters of the word so as to form a triangle, capable of being read many ways, on a square piece of paper. Fold the paper so as to conceal the writing, and stitch it into the form of a cross

A B R A C A D A B R A
A B R A C A D A B R
A B R A C A D A B
A B R A C A D A
A B R A C A D
A B R A C A
A B R A C
A B R A
A B R
A B
A

with white thread. This amulet wear in the bosom, suspended by a linen ribbon, for nine days. Then go in dead silence, before sunrise, to the banks of a stream that flows eastward, take the amulet from off the neck, and fling it backwards into the water. If you open or read it, the charm is destroyed. The adjoining is one of the principal forms of arranging this mystic word.

ABRAHAM, the progenitor of the Israelitish nation. He was a native of Chaldæa, but migrated, with his wife Sarah and his nephew Lot, to Canaan, where he lived a nomadic life, and worshipped the one God, Jehovah, in the midst of the polytheistic Canaanites. The details of the narrative, as given in the book of Genesis, are familiar to every one. A. died at the age of 175 (about 1800 B.C.). Of his two sons, Isaac was the ancestor of the Israelites; and the Arabs claim to be descended from Ishmael, whose mother was Hagar, a bond-woman. Later tradition ascribed to A. a complete knowledge of astronomy and philosophy, the invention of alphabetic writing, the art of interpreting dreams, etc. Even among Mohammedans, A. is reckoned a prophet and the friend of God; and they attribute to him the building of the sacred Kaaba at Mecca.

ABRAHAM'S BOSOM, a synonym among the Jews for felicity. In reclining at table, a custom almost universal in the East, the second person's head would be near the bosom of the first one, who might be the host or some more distinguished man. To be in that position to his bosom was to be the preferred friend or guest. While Dives was in torment, Lazarus was in Abraham's bosom.

ABRAHAM-A-SANCTA-CLARA, a very eccentric but popular and useful German preacher, was b. 1642, and d. in Vienna 1709. His real name was **ULRICH MEGERLE**, but he is generally known by the name given to him in his monastery. Uncouth puns, coarse expressions, and strange freaks of humor marked his sermons; but beneath their fantastic shells they had good kernels. A. was an honest, faithful, and devoted priest, as was proved by his self-sacrificing conduct during the plague in 1679. Though very severe in his reproof of vice, he was highly esteemed. The singular style of his writings is indicated by their very titles, e.g., *Gack Gack*, i.e., *Wallfarth Maria Stern in Teva*; *Heilsames Gemisch-Gemisch* (Wholesome Hodgепodge). His collected works amount to twenty vols. (1835). A selection was published in 2 vols. (1846).

ABRAHAM-MEN, a class of sturdy beggars who simulated lunacy, and wandered about the country in a disorderly manner; at one time working on the sympathy and at another on the fears of women, children, and domestics. They were common in Shakespeare's time, and, it would seem, existed even as late as the period of the civil wars. The term is a cant one. "An Abram cove," as Decker, in his *English Villanies*, calls one of these mendicants, meant one who personated a "Tom o' Bedlam." He would "disguise himself in grotesque rags, with knotted hair, long staff, and with many more disgusting contrivances to excite pity," but he did not hesitate to live by thieving too, and, when detected pilfering or in any species of depredation, he pleaded the immunities of the real Bedlamite, who was formally permitted to roam about the country when discharged from "Bethlem Hospital." A verbal relic of this class is still preserved in the slang phrase, "to sham Abraham."

ABRAHAMITES, or Bohemian deists. Under this name, a number of residents in Bohemia, trusting to the edict of toleration issued by Joseph II., avowed themselves (1782) as believers of the doctrine alleged to have been held by Abraham before his circumcision. As early as the 9th c., a sect of the same name had arisen in Syria, and had denied the divinity of Christ. But the Bohemian deists professed to be followers of John Huss, though they held no Christian doctrine beyond that of the unity of God, and accepted nothing of the Bible save the Lord's Prayer. As they would join neither Jewish nor Christian sects, the emperor refused to tolerate them; and in 1783 expelled them from their native land, and scattered them in various parts of Hungary, Transylvania, and Slavonia, where many were made converts to the Roman Catholic church, while others died as martyrs to their simple creed.

ABRANTES, a t. in Estremadura, Portugal, on the Tagus, 70 m. n.e. from Lisbon, in a fine situation. The hill-slopes around it are covered with olive-trees and vineyards, and there is considerable trade in fruit, corn, and oil. The town is strongly fortified, and is an important military position. At the convention of Cintra it was ceded to Great Britain. From this town marshal Junot took his title of duc d'Abrantes. Pop. 6000.

ABRANTES, DUKE OF. See **JUNOT**.

ABRAVANEL', or **ABARBANEL'**, ISAAC BEN JUDAH, b. Lisbon, 1437, d. Venice, 1508; a Jewish Rabbi of Spain, who claimed descent from king David. He was remark-

ably learned, especially in biblical literature. In early life A. was employed in financial matters by Alfonso V., but after that king's death he and the other ministers were banished from Portugal and their property was confiscated. In Spain he made a fortune as a merchant, and was in high favor with Ferdinand and Isabella in 1487, but the decree of 1492 banished all Jews from Spain, and A. fled to Naples, where he found royal favor, but was again obliged to fly when Naples surrendered to the French in 1495. He settled last at Venice. Though so much driven about, he wrote many works, and was esteemed one of the ablest men of his time. His writings were mainly in defence and exposition of the Hebrew religion. One of his sons wrote a work in Italian.

ABRAXAS STONES are so called from having the word *abraxas* or *abrasax* engraved on them. They are cut in various forms, and bear a variety of capricious symbols, mostly composed of human limbs, a fowl's head, and serpent's body. These gems, whose value and significance have been greatly exaggerated, are common in collections, and are represented as coming from Syria, Egypt, and Spain. It is certain that the use of the name abraxas was at first peculiar to the Gnostic sect of the Basilides (q.v.); and probably the word, by taking the numerical value of its Greek letters, may signify the number 365, so that there is no need to have recourse to old Persian or Egyptian, as is sometimes done. The Basilidians, however, did not designate by this name the highest deity, but the spirits of the world collectively. At a later period, the doctrines and practices of the sect were carried by the Priscellianists to Spain, whence many of these stones are got. Gnostic symbols were afterwards adopted by all sects given to magic and alchemy; and thus there is little doubt that the greater part of the abraxas stones were made in the middle ages as talismans.

ABROGA TION of laws is the repealing or recalling of them—as where a statute repeals a previous one. Generally, in America, all statutes, no matter how old, or how unsuited soever to the times, remain in force until they are expressly repealed. But in Scotland a statute may become obsolete and virtually repealed, so that it may not, owing to the lapse of time, be founded on. See **STATUTES**.

AERUS, a genus of plants of the natural order *leguminosæ*, sub-order *papilionaceæ*, of which the only known species, *A. precatorius*, is a shrub, originally belonging to India, where it is chiefly found in clayey soils, but now not uncommon in the West Indies and other tropical regions. The roots possess properties exactly similar to those of the common liquorice. The seeds are nearly spherical, as large as small peas, of a scarlet color, with a black scar, and are familiar enough to most people in Britain, being used as beads. They are narcotic.

ABRUZZI AND MOLISE, a district of Italy, comprising the provinces of Teramo, Chieti, Aquila, and Campobasso, of which the first three formed the n. e. corner of the kingdom of Naples, and were known as—Abruzzo Ulteriore I. and II., and Abruzzo Citeriore. These three divisions correspond to the present Italian provinces Chieti, Teramo, and Aquila respectively. The whole district contains 6384 sq. m., and, 1894, 1,379,559 inhabitants. Its chief towns are Chieti, Teramo, Aquila, Sulmona. It forms the wildest and loftiest portion of the Apennines. The streams are numerous, but the only river of any consequence is the Pescara, which flows into the Adriatic. The rent and jagged mountain groups arrange themselves in picturesque shapes, reaching in Il Gran Sasso d'Italia, or “the great rock of Italy,” which is the highest of the chain, the elevation of 9800 feet. The highlands slope precipitously on all sides, but especially towards the n.e. shore. The climate of A. is raw in the higher regions; snow rests on the hills from Oct. to April, and on some of the peaks all the year round; but the valleys are extremely fertile, though husbandry is in a wretched condition, and the low, open plains are left without the slightest protection from inundations of the rivers in spring, or means for irrigation in the arid summer. Dense forests of oak and fir clothe the sides of the mountains; at the base, almond, walnut, and other fruit-trees grow abundantly; olives in the deep-lying valleys. Fine cattle pasture in these regions; herds of swine roam through the lofty pine-woods; and the remoter fastnesses are the haunt of bears, wolves, and boars. The chief importance of A. used to be its military position as a defence of the kingdom of Naples. There are few roads into it, so that it is very difficult for an enemy to reach Naples from the n. It is admirably suited for the purpose of guerilla warfare. But the people have ceased to possess a reputation as banditti. No trace of the old spirit which made their ancestors, the Marsi, Sabines, and Samnites so terrible to the Romans, and which in modern times manifested itself in a love of petty plundering, is to be found. They have become a race of rude and simple shepherds, fondly attached to their mountain homes, musical, superstitious, and hospitable; but they are robust and powerful, and during the French invasion of Naples, in 1799, displayed a vigorous courage in opposing the soldiers of the revolution.

AB SALOM, the third son of David, king of Israel, remarkable for his beauty, and for his unnatural rebellion against his father. By popular acts he contrived to win the affections of the people, and then stirred up a formidable rebellion. The adherents of the king having rallied round him, a battle was fought in the forest of Ephraim, in which the rebels were defeated. In the flight, as A. was riding under a tree, his hair caught in the branches, and he was left suspended in which position Joab, the commander of

David's army, thrust him through, contrary to the king's express orders that he should be spared. The grief of David for his loss was excessive. See 2 Sam. c. 18.

ABSCCESS (*apostema*), a collection of purulent matter formed by disease within some tissue or organ of the body. The process by which an abscess is formed is the following: First, the capillary vessels become overcharged with blood, in consequence of inflammation. From the blood thus made stagnant, or flowing very feebly, a fluid exudes through the walls of the capillary vessels, and, containing a large portion of albumen, becomes pus or purulent matter. This matter, at first contained in the minute interstices of the tissues, gradually dissolves them, and so makes for itself a larger cavity; and frequently, by gradual dissolution of the adjacent parts, works its way either to the surface or to some natural cavity of the body. Pus thus makes its appearance often in a different part of the body from where it was formed. It also occurs that when the purulent matter does not find any outlet, either naturally or artificially, it is gradually dried up or absorbed. In abscesses superficially seated—either in or close under the skin—the early treatment consists chiefly in promoting the formation of pus by the application of moist and warm bandages or poultices. The next step is the removal of the pus. When this is too long delayed, serious disturbance of the organ, or even poisoning of the blood, may ensue. An abscess must be regarded not as a distinct, original disease in itself, but as the result of another disease—inflammation; or as an effort of nature for the removal of injurious matters from the system.

ABSCHIEDS SYMPHONIE (Farewell symphony), by Haydn, dated 1773, on the autograph score. It was written as an appeal to the Prince von Esterházy to allow the musicians leave of absence. One after another stopped playing and left the orchestra, and Haydn's object was attained through this delicate hint.

ABSCISSA. See PARABOLA.

ABSENTEE, a term applied, by way of reproach, to capitalists who derive their income from one country, and spend it in another. It has been especially used in discussions on the social condition of Ireland. As long as Ireland had its own parliament, a great portion of the large landed proprietors lived chiefly in the country during summer, and passed their winters in Dublin; thus spending a large portion of their incomes among their dependents, or at least among their countrymen. The union changed the habits of the Irish nobility and gentry, who were attracted to London as the political metropolis, or were induced, by the disturbed condition of Ireland, to choose residences on the continent. Such Irish landed proprietors were styled "absentees;" and it was argued that their conduct was the great source of Irish poverty, as it drained the resources of the land, or, in other words, sent money out of Ireland. One class of political economists—among them M'Culloch—maintain that, economically viewed, absenteeism has no injurious effect on the country from which the absentee draws his revenue. An Irish landlord living in France, it is argued, receives his remittances of rent, not in bullion, but in bills of exchange; and bills of exchange represent, in the end, the value of British commodities imported into France. The remittance could not be made unless goods to the same amount were also drawn from Britain. Thus, although the landlord may consume, for the most part, French productions, he causes, indirectly, a demand for as much of British productions; and his income goes, in the end, to pay for them. His residence abroad, then, does no harm to the industry and resources of the country at large, although it is admitted that it may be felt as an evil in a particular locality. The truth of this doctrine, however, in its full extent, is disputed. Among other objections to it, it is argued that whatever may be true of the amount actually consumed, all the tradesmen and others who supply the absentee's wants have their profits, and have thus the means of accumulating; and that these accumulations which are thus added to the national wealth of a foreign country would have been added to the wealth of his native country had he been living at home. The result of the controversy would seem to be that absenteeism does, to some extent, act injuriously on the wealth of a country, though it is not true that the whole revenues thus spent are so much clear loss, there being several indirect compensations.—On the evil of absenteeism, in a moral point of view, all are agreed; especially in a country in the condition of Ireland, where nearly the whole wealth is in the hands of extensive landed proprietors, with almost no middle class. The possessors of land have duties to perform which cannot be deputed; the very least of these obligations being that of setting a good example in a neighborhood, and one not less important being that of giving personal aid in effecting local improvements. It is a bad sign of the social condition of a country when its proprietors systematically live abroad, or in great cities away from their estates. The relations between landlord and tenant then become more and more cold and distant; while, too often, the agents of the landlords have no good feeling towards tenants, but strive only to raise as large sums as possible for their principals.

ABSINTHE. See LIQUEUR and ARTEMISIA.

ABSINTHE, or WORMWOOD, spirits prepared from the leaves and flowering tops of *artemisia absinthium*, united with angelica root (*archangelica officinalis*), sweet-flag root (*acarus calamus*), dittany leaves (*origanum dictamnus*), star-anise fruit (*selicium anisatum*), and other aromatics, macerated in alcohol eight days, and distilled. The product is an emerald colored liquor, to which anise-oil is added. This is the genuine

French *extrait d'absinthe*, but much of inferior quality is made with other herbs and essential oils, while adulterations are numerous and deleterious. In adulteration the green color is usually produced by turmeric and indigo; but blue vitriol has often been detected. In commerce are two kinds of A., common and Swiss, the latter prepared from highly concentrated spirits, and when genuine is most trustworthy as to herbs used. The chief place of manufacture is Neufchatel. It is mostly consumed in France, but large quantities are exported to the U. S. Absinthe was first used by the French soldiers in the Algerine war (1844-47), mixed in their liquor, as a febrifuge, and they brought the habit to France, where it has become so great an evil that its use is prohibited in both army and navy. Excessive use of A. gives at first a feeling of exhilarated intoxication; the digestive organs are immediately deranged; the appetite destroyed, then raging thirst, giddiness, ringing in the ears, hallucinations of sight and heavy mental oppression, anxiety, loss of brain power, and idiocy succeed each other rapidly. The moderate drinker soon feels muscular twitchings and loss of strength, his hair falls out, his countenance is mournful, and he becomes emaciated, wrinkled, and sallow; lesion of the brain, horrid dreams, gradual paralysis, and death follow in successive order. It is more deleterious and dangerous than brandy or any other strong spirits.

ABSOLUTE stands opposed to *relative*, and means that the thing is considered in itself, and without reference to other things. In physics, we speak of the *absolute* velocity of a body—i.e., the rate of its motion through space; and of the *relative* velocity of two bodies—i.e., the rate at which they approach or recede from one another, one or both being in motion. In the language of modern metaphysics, the absolute is the unconditioned, unalterable original—that which is the ultimate cause and ground of the phenomena of the visible world. Cousin and others use absolute as self-existent or “being” in itself, which is the primitive in thought, the ultimate in science, and the object of immediate intuition; or the infinite, recognized solely as pure being. But the knowledge of an absolute has been held impossible, on the ground that knowing is in itself a relation between a subject and an object; what is known only in relation to a mind cannot be known as absolute. It is therefore said, of an absolute there is no knowledge: first, because to be known a thing must be consciously discriminated from other things; second, because it can be known only in relation with a knowing mind. Discussion of the absolute raises the controversy whether the pure, unconditioned absolute “being” held to by Cousin and some German specialists is real, living being or God, or only a logical abstraction. Gioberti maintains that as the terms used are abstract, the idea they evolve can be only a logical deduction by the mind operating upon its own conception, regardless of space, time, or conditions; that, therefore, the absolute is no real being, but a generalization of metaphysical phenomena, and as far removed from the real and necessary being of the schoolman, from the real, living God, in whom men believe, as nothing is from being something. Kant, while denying the absolute or unconditioned, as an object of knowledge, leaves it conceivable as an idea regulative of the mind’s intellectual experience. It is against any such absolute—whether real or conceivable—that Sir William Hamilton and Rev. Henry Mansell have taken ground, the former in his review of Cousin’s “Philosophy,” and the latter in lectures on religious thought. This, however, is strongly controverted.

ABSOLUTION, originally a term of Roman law, signifying acquittal, is now used in an ecclesiastical sense. In the primitive Christian church, its form was this: Members that had given scandal by gross and open sins were excluded from the Lord’s supper or from the congregation altogether, and could be readmitted only if they repented and underwent the penance laid upon them by the church. When they had done so, the presbyter, along with the elders, pronounced the absolution in presence of the congregation—meaning that the congregation forgave the offence, on their part, and received the sinner again into their number. Down to the 3d c., the concurrence of the congregation continued to be necessary to absolution. But by the 4th c. it had become a right of bishops to absolve, and the public confession had gradually turned into a private confession before the priest, who now imposed the penance himself, modified or remitted it, and then absolved. Absolution had not, as yet, been extended to any but open and gross sins; but when the dominion of the hierarchy over men’s minds had reached its height, and the fourth Lateran council (1215) had made auricular confession, at least once a year, obligatory, confession and its attendant absolution were extended to all sins whatever; and the absolution was made to convey, not merely, as before, forgiveness on the part of the church, but forgiveness in the sight of God. The formula, *Deus or Christus absolvet te*, which was used till the 12th c., was changed into *Ego absolvo te*; thus ascribing to the priest the power to forgive sins in the sight of God. This is still the received theory of absolution in the Roman Catholic church, sanctioned by the council of Trent, and grounded on John xx. 21.—The Protestant churches, generally, ascribe to the absolution of the clergy only a declarative power; on the ground of repentance, it announces and assures forgiveness on the part of God, but does not impart it. See **PENANCE**.

ABSOLUTISM is that form of government in which the supreme power is in the hands of a ruler, unlimited by any constitution or laws. This system of government arose in Western Europe on the decline of feudalism. The first form of government after that consisted of a monarch whose will was supreme, surrounded by courtiers, and having a regular army in the place of the old feudal militia. Not only the church and the uni-

versities, but law, science, everything was taken into his service and subordinated to his will. A mild form of absolute monarchy is familiar to the student of English History in the House of Tudor, with its monarchs of strong will and arbitrary methods, but a representative absolute monarch of those times is better seen in Louis XIV. of France, with his famous assertion, *L'état c'est moi* (I am the state). The only absolute monarchies existing in Europe now are those of Russia and Turkey. See AUTOCRACY.

ABSORBENTS. See LACTEALS and LYMPHATICS.

ABSORPTION. All the membranes and tissues of living bodies have the positive property of absorbing fluids—a property that continues after death and until decomposition. In absorptions in animal organisms fluids do not penetrate tissues mechanically through orifices, for the existence of such orifices, or open mouths, once taken for granted, has been disproved by late microscopic research. It may therefore be surmised that absorption is equivalent to molecular combination of organs or tissues and fluids or things absorbed. Animal substances differ in absorbing power with difference in liquids, taking, for example, 100 parts of clear water and only 65 of brine, and less if the brine be stronger; and a tissue taking 100 parts of brine will not receive a quarter as much of an oily liquid. An idea of differences may be got from Chevreul's table:

100 Parts of	Absorb in 24 Hours.	Parts of Water.	Saline Solution.	Oil.
Cartilage.....	"	231	125	
Tendon.....	"	178	114	8.6
Elastic ligament.....	"	148	80	7.2
Cartilaginous ligament....	"	319		3.2
Cornea.....	"	461	370	9.1
Dried fibrine.....	"	301	154	

Activity of absorption varies with the freshness of the membrane, being most the soonest after separation from the principal parts; and varies also with pressure, motion, and temperature. *Absorption of oxygen* by the blood in the lungs is apparently instantaneous, the change in color from blue to red as soon as it arrives at the pulmonary vessels showing the action of the gas it has taken from the atmosphere. This rapidity of absorption is due to the diffusion of the blood in a great number of minute channels, whereby the vascular and absorbing surfaces are brought into contact over a large surface; and to the incessant motion of the fluid, by which its effects become perceptible at the earliest possible time. Claude Bernard found that if a solution of iodide of potassium were injected into the duct of the parotid gland on one side of a living animal, the saliva discharged by the corresponding gland on the other side almost instantly afterwards contained iodine. In a measureless instant, therefore, the iodine was taken up by the glandular membrane on one side, absorbed by the blood, carried to the heart, absorbed from the blood by the glandular membrane on the other side, and furnished to the saliva. It is by this process of absorption that the elements of nutrition are taken from the intestines and conveyed to the tissues they are to nourish; the bones absorb much calcareous matter from the blood, cartilages less, and muscles less still; the brain takes more water than does muscle, and muscle more than bone. Late medical schools agree that the action of drugs and poisons takes the same course. Opium dissolved by the liquids of the stomach is absorbed by the membraneous lining, taken away by the blood and distributed well through the body; at the brain it is absorbed by the cerebral substance, acts upon the nervous matter, and produces narcotism or insensibility, and the brain, through its nervous ramifications, affects the whole body. The quickness of absorptive action is shown in using hypodermic injections; almost before the syringe has punctured the skin of the forearm a severe pain in the foot is sensibly relieved. *Absorption of Gases by Solids.*—Solid metals will sometimes absorb gases. Gaseous hydrogen has been found in newly-fallen meteorites, obtained perhaps while passing through nebulae. Palladium will take 643 times its own volume of hydrogen; silver and platinum absorb oxygen; titanium takes nitrogen; hydrogen will pass through platinum and red-hot iron like water through a sieve. Liquids rapidly absorb gases; water near the freezing point contains in volume 4 per cent of oxygen and 2 per cent of nitrogen, equal to 4 oxygen in 6 parts, while air has only 1 oxygen in 5 parts. At the temperature of 70° the power of absorption is reduced to one half, and at boiling nearly all absorbed gases are thrown off. Under low pressure less and under high pressure more gas can be taken in. Solutions of neutral salts absorb about the same amount as water, except sulphates; acids absorb least, dilute sulphuric taking less than a quarter of one per cent in volume. *Absorption of Heat.*—The capacity of substances for absorbing heat varies widely; it is least in smoothly polished or bright and light colored objects; greatest in dark colored and rough surfaces. It is found in regard to color, that more depends on the coloring material than on the color itself. When the heat-giving body is non-luminous, color is without influence, but great in case of luminous bodies. There are also great differences in the absorbing power of transparent substances; rock-salt absorbs only 8 per cent of the heat passing through with the light, fluor spar 25 to 50 per cent, Iceland spar and glass 60 per cent, alum 90 per cent, and ice 94 per cent. These substances transmit the heat which they do not absorb. *Absorption of Light* is the process which takes place when light enters an imperfectly transparent medium, a portion of the light being stifled or spent in producing some physical effect, while the remainder is either directly transmitted or emerges after one or more internal reflections.

A body absorbing all the light that reaches it would be perfectly black and wholly invisible but in point of fact the blackest object reflects some light from its surface. A body absorbing none but reflecting all light would be perfectly white. In general the different parts of white light are absorbed with unequal energy, and thus the light which escapes absorption is colored. In most cases the colors of natural bodies are occasioned in this way. Transparent substances absorb light in varying degrees, and in many of them an elective absorption takes place; glass, gems or liquids absorb certain colors and let others pass, those which pass determining the color of the substance. Occasionally a color complementary to one absorbed is reflected, as red rays transmitted from red aniline and green rays reflected. Certain crystals are polychromatic, showing changing colors as light passes through in different directions.

ABSTE MII, the name given to those who could not partake of the sacramental cup because of their natural aversion to wine. Calvinists allowed them to touch the cup with the lips without drinking, which Lutherans considered profanation. Later, and in America especially, there has been a division as to the propriety of using wine in the communion, the radical opposers of alcoholic drinks urging the use of the unfermented juice of the grape.

ABSTINENCE. See **FAST**.

ABSTINENCE SOCIETIES, associations for the promotion of abstinence from all kinds of alcoholic liquors, and the members of which usually receive the designation of abstainers or teetotalers—this last phrase inferring an utter and uncompromising abstinence, or at least that the only exception shall be for sacramental and medical purposes. Abstainers usually take a pledge or vow to that effect; the ground of their abstinence from alcoholic liquors being that they are injurious to, or at least no way promotive of, health, and that from the great social evils of intemperance it is important to set an example of entire abstinence. A. S. exist in great numbers in North America and the United Kingdom. See **TEMPERANCE**.

ABSTRACTION is that intellectual process by which the mind withdraws (*abstraho*) some of the attributes of objects from the others, and thinks of them to the exclusion of the rest. The abstract is opposed to the concrete. John, William, my brother, form concrete images in my mind, each with a multitude of attributes peculiar to himself. But they have also certain attributes common to them and to all individuals of the race; I can overlook the others and attend to these, and thus form a notion or conception which is called a *man*. Man is, therefore, an abstract notion, the word connoting, as it is called, a certain though not very well-defined number of attributes. With the exception of proper names, all nouns are thus abstract. There are degrees, however, in abstraction. The abstract notion *animal* rises above that of *man*, embracing all men and innumerable organized beings besides. An *organized being*, again, is a still higher stage, and embraces both animals and plants. Being, time, space, are among the highest abstractions. The higher abstractions rise, the fewer attributes are implied or connoted in the name; hence the propriety of the phrase, *empty abstractions*. On the other hand, the number of objects to which the name is applicable increases; and thus reasoning in abstract terms has the advantage of being general, or extensive in its application. But such reasoning is apt to become vague and fallacious, unless constant regard is had to concrete instances. Abstract language is best adapted for scientific exposition: concrete for graphic and poetical effect.—**ABSTRACT** in Arith. is applied to numbers considered in themselves, and without reference to any objects numbered; thus 7, 20, are abstract numbers; but 7 ft., 20 horse, are concrete numbers.

ABSURDUM, REDUCTIO AD, the method of proving a truth by showing that to suppose the proposition untrue would lead to a contradiction or absurdity.

ABSINTH IUM. See **WORMWOOD**.

ABT, FRANZ, b. 1819, in Saxony. He began to study theology, but left it for music, and at 23 was musical director at Zurich; 11 years later, second musical director at the Brunswick court theatre, and promoted by the grand duke in 1855 to be first director. A. was a composer for piano, orchestra, and voice, but best known as a song writer, succeeding especially in part songs for male voices. He was the author of *When the Swallows Homeward Fly*. He visited the U. S. in 1872. He d. in Wiesbaden in 1885.

ABU' or **BU**, Arab for "father," is prefixed to many Arabic proper names, as the equivalent syllable *Ab* is prefixed to Hebrew names: ex., Abu-bekr, "father of the virgin" (Ayesha). But *Abu*, like *Ab*, often signifies merely possessor; as in Abulfeda (possessor of fidelity), "the trusty;" Abner, "the brilliant"—literally, "father or possessor of light."

ABU', a mountain of India, in the territory of Serolie, in Rajpootana, rising far above any other of the Aravulli ridge, and said to be about 5000 ft. above the sea. The base is broad, its circuit being estimated at 40 to 50 m.; the summit is very irregular, and divided into many peaks. It is a celebrated place of pilgrimage, especially for the Jainas, who have a magnificent group of four temples at Dilwara, about the middle of

the mountain, one of which, the Vimlah Sah, is described as "the most superb of all the temples in India."

ABU-BEKR, "Father of the virgin" Ayesha, the wife of Mohammed, was a man of great influence in the Koreish tribe, and in 632, when Mohammed died, was made the first caliph or successor of the prophet. After defeating his enemies in Arabia, and warring successfully against Persia, Syria, and the Byzantine emperor Heraclius, Abubekr d. 634 A. D., and was buried at Medina, near the remains of Mohammed and his wife Ayesha (q. v.).

ABU KLEA, in the Soudan, is the scene of the battle fought on January 17, 1885, in which the Mahdi's forces were defeated by the English troops under Sir Herbert Stewart. It is located on the route between Korti and Metammeh, both of which are on the great bend of the Nile below Khartoum. See MAHDI.

ABULFARAJ' (Lat. *Abulfaragius*), 1226-86, called also Barhebræus—i. e., Son of the Hebrew, as being by birth a Jew, though afterwards a Christian—was b. at Malatia, in Armenia, and became so distinguished for his knowledge of the Syriac, Arabic, and Greek languages, and of philosophy, theology, and medicine, that he was called the phoenix of the age. At the age of twenty, he was made bishop of Gula, and afterwards of Aleppo; and rose to the rank of maphrian, the highest dignity among the Jacobite Christians next to patriarch. Of his numerous Syriac and Arabic writings, most of which yet lie buried in the library of the Vatican, the best known is a *Chronicle*, in Syriac, of universal history from Adam down to his own time. The first part of it was published at Leipsic in 1789, the rest (3 vols.) at Louvain in 1872-4. A. himself abridged this work in Arabic, under the title of *History of the Dynasties* (edited by Pococke, Arab and Lat., Oxf. 1663). Among his writings of a theological kind may be mentioned his *Magazine of Mysteries*, being a commentary on the Syriac version of the Bible.

ABUL-FAZL, Vizier and historiographer of Akbar, the great Mongol emperor; b. about the middle of the 16th c. His work is *The Book of Akbar*, in two parts; the first part being a complete history of Akbar's reign, and the second an account of the religious and political constitution and administration of the empire. The style is excellent, and the second part is of unique and enduring interest. An English edition, now very rare, was published in 1783-6, and reprinted in London. A. d. by the hand of an assassin, while returning from a mission to the Deccan, in 1602.

ABULFEDA, a Moslem prince, known as a writer of history, was b. 1273 A.D., at Damascus; and during his youth distinguished himself in several campaigns against the Christian kingdom founded by the crusaders. From 1310 to the time of his death, he ruled over the principality of Hamath, in Syria, was a true ally of the sultan, visited Egypt and Arabia, patronized literature and science, and d. in 1331. He left several important works in Arabic, among which are his annals, the earlier portion of which has been edited by Fleischer, under the title of *Historia Anteislamica* (Leip. 1831), and the rest by Reiske, in his *Annales Moslemici* (Copenh. 1789-94). This work was in great part compiled by A. from earlier Arabic authors, and is a valuable source of history, especially of the Arabic empire. He also wrote a geography, which has been edited, with a French translation, by Reinaud and De Slane (Par. 1848), and by Reiske (Dresden, 1842).

ABUSE OF PROCESS is the wrongful employment of a regular judicial proceeding. In order to sustain an action for malicious abuse of civil process, it is required to allege and prove both a want of probable cause and the existence of a malicious motive.

ABUSHEHR' (variously written Bushehr, Bushire, in Pers. Bendershehr) is the name of a seaport on the e. coast of the Persian gulf. It is situated at the extremity of a peninsula. The district is liable to be devastated by earthquakes and the simoom, and is deficient in water; but the situation is so favorable for commerce that the trade exceeds £1,500,000 a year (of which three fourths represent imports). It is the land terminus of the Indo-European telegraph line; the head-quarters of the English naval squadron in the Persian gulf; and a chief station of the British Indian Steam Navigation Co. The exports are horses, fruits, shawls, pearls, silk, rose-water, asafoetida, copper, gall-nuts, etc.; imports, sugar, indigo, iron, cotton goods, etc. Pop. nearly 27,000.

ABU-SIMBEL. See ABOUSAMBUL.

ABU-TEMÂM', 806-45; an Arabic poet; b. in Syria; a prolific writer, and much praised. The Arabs said, "No man ever dies whose name has been praised in the verses of Abu-Temâm." He made three collections of Eastern poetry, one of which the *Hamasa*, is praised by Sir Wm. Jones.

ABUTMENT, in arch., is the part of a pier or wall from which an arch springs, and which resists the outward thrust. The term *impost* is used when the arch is a semicircle, so that the pressure is vertical. In reference to a bridge, the abutments are the walls adjoining the land, which support the ends of the roadway, or the extremities of the arch or arches.

A BÛ-YÛSÛF-YAKÛB', called AL-MANSÛR, or "The Victorious," 1160-98; the fourth sultan of the Almohade dynasty in Africa and Spain. His father was killed at the siege of Santarem, 1184; and as soon as he had quelled certain insurrections in Morocco, A. invaded Spain and carried off to Africa 40,000 captives. In a second foray he cap-

tured Torres and Silves, in Portugal; and, in a third venture, defeated the Christians under Alphonso III., near Valencia, and captured Madrid and four other important cities. He died in Morocco.

ABYDOS, a t. in Asia Minor, situated at the narrowest part of the Hellespont, opposite Sestos. It is celebrated as the place whence Xerxes and his vast army passed into Europe in 480 B.C.; also as the scene of the story of Hero (q.v.) and Leander. In the later times of antiquity, the people of A. were reproached for their effeminate and dissolute manners.—There was another ABYDOS in Upper Egypt (Thebais), on the left bank of the Nile, and on the main route of commerce with Libya. Even in the time of Strabo, this t. was in ruins. Here the remains of the Memnonium and of a temple of Osiris are still remarkable. In the former, W. J. Bankes, in 1818, discovered the celebrated tablet of A., bearing, in hieroglyphics, a genealogy of the eighteenth dynasty of the Pharaohs. It is now in Paris, and copies have been published.

AB'YLA and **CAL'PE**. See **HERCULES. PILLARS OF**.

ABYSS, used in Scripture to denote the ocean, or the under world, and for Hades, or the place of the dead, but indicating especially the place where sinful souls were imprisoned. In the A. were imprisoned the giants of old; and there the prophets tell us the kings of Egypt, Tyre and Babylon were punished for pride and cruelty. The A. was the place dreaded by evil spirits, and to which they begged the Savior not to send them. A vast, boundless and chaotic region of darkness is common to most mythologies, and is called the A., or by some name of similar signification.

ABYSSINIA, called Habesh by the Arabs, is the large tract of highlands in the e. of Africa. From the Red sea, on the n.e., it rises in terraces towards the s.w. Between the highlands and the Red sea lies a flat tract called Adal, narrow at the n. (in lat. 50° 30'), and widening to the s. The plains of Nubia and Kordofan form the boundaries on the n. and w., while the southern limits are not well known. The total area is about 200,000 sq.m., and the population 3,000,000 to 5,000,000. The country consists of high tablelands, intersected by deep ravines formed by the rivers, and steep sandstone terraces. Numerous mountain-chains, mostly of volcanic origin, rise above the table-lands; the highest are the mountains of Samen or Samien, rising to about 15,000 ft. above the sea-level. Some of the plains have an elevation of from 7 to 10,000 ft. A. gives birth to numerous rivers, the largest of which are the Abai or Nile (Bahr-el-Azrek or Blue river), and the Takkazie, an affluent of the Nile. In the s. is the Hawash—from which the country takes its name—which flows eastward into the salt-lake of Assal in Adal. The largest lake is that of Tzana or Dembea, through which the Abai or Blue Nile flows. The climate in the elevated tracts of Abyssinia is temperate and salubrious; in the low tracts along the coast, and in the n. and n.w., the heat is excessive and the climate noxious. On the whole, A. is a country of great fertility; but, like the climate, the productions of the soil vary greatly with the different degrees of elevation. Wheat and barley are cultivated, also maize, the grains called teff (*Poa Abyssinica*) and tocusso (*Eleusine tocusso*), various leguminous plants, cotton, coffee, sugar-cane, tobacco, etc. The coffee-plant grows wild. Among wild animals, the lion, leopard, hyena, wolf, jackal, elephant, buffalo, rhinoceros, and zebra are found.

The people of A. belong mostly to the Shemitic race, and resemble the Arabs both in physical characteristics and structure of language. See **ΕΠΙΘΡΟΙΑ**. The ethnology of the country is variously given by different authorities. According to Rüppell, there are three principal races. The aboriginal Abyssinians, inhabiting the greater part of Amhara, and numerous also in Tigré, are of middle size, with oval faces, lips not thicker than those of Europeans, pointed noses, and straight or slightly curled hair. In this race he includes the Falashas, or Jews, the Gamant, and the Agows. A second race, abounding most in the n. of Tigré, have thick lips, noses blunt and somewhat curved, and thick hair verging on wooliness. The third are the Gallas, inhabiting the s. of Shoa and the regions w. of lake Dembea and the Abai; a large-bodied race, round-faced, short-nosed, with a depression between the nose and brow, deep-set lively eyes, and thickish lips. The color of these races is brown of various shades. The only negroes in A. are slaves from the country of the Shangallas, to the w.

The oldest accounts of the Abyssinians are full of fables, but seem sufficient to prove that they attained some degree of civilization even in remote antiquity. Christianity was introduced about the middle of the 4th c., and soon prevailed extensively. Axum was at that time the capital. Two centuries later, the Abyssinians were powerful enough to invade Arabia, and conquer a part of Yemen. In the subsequent struggles against the invading Moslem, the coast-land Samhara and the country of Adal were lost. In the 10th c., a Jewish princess overthrew the reigning dynasty, the surviving representative of which fled to Shoa. After three centuries of confusion the empire was restored under Icon Amlac, and some progress was made in improvement. Early in the 15th c., the Abyssinians entered into close relations with the Portuguese, by whose assistance the empire was saved, in 1540, from falling into the hands of the invader Granie, sultan of Adal. The southern provinces, however, were lost, and the seat of empire was removed from Shoa to Gondar. Under the influence of the Portuguese missionaries, the royal family adopted the Roman Catholic faith; and the old Coptic church was formally united to the see of Rome. The people and ecclesiastics obstinately resisted the innova-

tion; the emperor gave way; and ultimately, in 1632, the Romish priests were expelled or put to death. In consequence of the commotions thus excited, the monarchical power declined, while that of the governors of provinces greatly increased, and indeed became almost absolute. Abyssinia has become important of late years for reasons given below. The political divisions of the country are subject to continual alteration; but the following are the most important: 1. The kingdom of *Tigré*, extending between the river Takkazie or Bahr-el-Aswad (Black river), and the mountains of Samen on one side, and the district of Samhara on the other. Its chief towns are Antalo and Adowa. 2. The kingdom of *Gondar* or *Amhara*, extending on the w. of the Takkazie and the Samen mountains. The capital, Gondar, is situated in the n.e. of the plain of Dembea or Gondar, at an elevation of 7420 ft. 3. The kingdom of *Shoa* (including *Efat*), lying s. of Amhara and separated from the Galla tribes by the Hawash. This is, by all accounts, the best organized and most powerful state now existing in A. The capital, Ankobar, at an elevation of 8198 ft., contains from 7000 to 10,000 inhabitants, and enjoys a delightful climate. The Gallas, a savage but enterprising race, effected a settlement in the s. of A. in the 16th c.

In consequence of invasions and civil warfare, the present social and political condition of A. is very unfavorable. The kingdom of Shoa is in better circumstances than the other states. Though Christianity is still the professed religion of the majority of Abyssinians, it exists among them only in its lowest form, and is little more than ceremonial. Their church is national and independent, but the visible head, or *abuna* ("our father") is ordained by the Coptic patriarch of Alexandria. The doctrines of the Abyssinian coincide with those of the Coptic church, especially in the monophysite heresy; but several peculiar rites are observed, including circumcision of both sexes, and observance of the Mosaic laws respecting food, etc.; love-feasts, and adult baptism. The oldest Abyssinian churches are hewn out of rocks. The modern churches are mostly small, round, or conical buildings, thatched with straw, and surrounded by pillars of cedar. Statues and bas-reliefs are not tolerated in churches, but paintings are numerous. The state of manners and morals in A. is as low as might be looked for in a country so long a prey to anarchy and violence. Human life is lightly valued, the administration of justice is barbarously negligent and corrupt, and the marriage-bond is tied and loosed with extreme facility. The land generally yields at least two crops annually; but the agriculture is miserable, and the condition of the lower classes proportionally wretched. Among fruits, the fig is the most plentiful. Wine is used only for the Eucharist; the common drink is *bouza*, a kind of sour beer, made from the fermentation of bread. The manufactures of A. are rude. The foreign trade is carried on through Massowah.

The present dynasty of Abyssinia is that of an adventurer, Kassai, who in 1853 deposed the actual Ras, or ruler, and had himself crowned king, under the name of Theodore. This prince, a man of great natural ability, subdued the whole of Abyssinia and attained to a degree of power beyond that previously exercised by an Abyssinian king. His enormous military establishment, however, finally exhausted the resources of his country, and excited such general discontent as to force him into tyrannical severity in order to maintain his throne. Failing to secure a European alliance, he became hostile to Europeans, and in 1864 his harsh treatment of the foreign consuls, and especially his imprisonment of their English envoys, led to the dispatch of an English force under General (afterwards Lord) Napier, of 16,000 men. In April, 1867, this army reached Magdala, which was carried by storm (April 13th), upon which Theodore committed suicide. From 1860 to 1882 the Egyptians carried on a desultory war with Abyssinia, which was terminated in 1882 by the abandonment of the Soudan (q.v.). In 1885 the town of Massowah was occupied by Italian troops, who had been from time to time attacked by irregular forces of Abyssinians, from whom they sustained a temporary defeat in January 1887, at Dogali. By a convention between Italy and Abyssinia, made in 1889 a sort of protectorate was effected by Italy over Abyssinia, but this was afterward repudiated by the Abyssinian King Menelek, who took up arms to expel the Italians. On March 1, 1896, his troops routed the Italian army at Adowa, and drove them back to the coast with a loss of some 10,000 men. See ITALY.

ACA'CIA, a genus of plants of the natural order *Leguminosæ*, sub-order *Mimoseæ*. The genus *A.* differs from *Mimosa* in the greater number of its stamens (10-200), and in the want of transverse partitions in the bivalvular legumes. The acacias are diffused over all quarters of the globe except Europe. The greater number of them have a singular appearance, because of the leaf-stalks spreading out in a leaf-like form (*phyllodium*); while the leaflets are more or less stunted in appearance, and frequently are altogether absent. Other species have bipinnate leaves, with a great number of leaflets, and are extremely beautiful. Many are of great importance in an economical point of view, because of the juice which flows from them, which, when inspissated, becomes an article of commerce under the name of gum (q.v.). The species called *A. gummifera*, *A. seyal*, *A. ehrenbergii*, *A. tortilis*, *A. nilotica*, and *A. vera*, natives of Africa, produce gum-arabic, also *A. speciosa* and *A. arabica*, natives of the south of Asia. *A. arabica* is called the Babul-tree in India, and its gum, babul. A gum similar to gum-arabic is produced by *A. decurrens*, *A. mollissima* (the silver wattle), and *A. affinis* (the black wattle), in New Holland, and by *A. karroo*, at the cape of Good Hope. Gum senegal is the produce of *A. vereh* and *A. adansonii*, natives of the western coast of Africa. Yet *A. vereh* is also said to yield true white gum-arabic. Catechu (q.v.) is obtained from the wood of *A. catechu*. The astringent bark and pods of some species are used for tanning. The bark of *A. arabica* is administered in India as a powerful tonic medicine. The pods of *A. concinna* form an article of commerce in India, its seeds being saponaceous and used in

of *A. arabica* is administered in India as a powerful tonic medicine. The pods of *A. concinna* form an article of commerce in India, its seeds being saponaceous and used in washing. A decoction of the pods of *A. arabica* is sometimes used in the same way. A considerable number of species afford useful timber. The flowers of many species are fragrant. A number of species from New Holland and other countries have been introduced into the south of Europe. Some are of frequent occurrence in greenhouses in Britain; and a few of the Australian species succeed tolerably in the open air in the south of England. The foliage of the acacias with bipinnate leaves shows a peculiar sensitiveness to changes of weather; when a thick cloud obscures the sun, the opposite leaflets close together, and so remain till the sun reappears. The locust-tree of North America (*Robinia pseud-acacia*) is often called *A.* both in Britain and upon the continent of Europe. Other species of *robinia* also receive the same name, as the rose *A.* and locust-tree (q.v.). *Flores acaciæ* (*A.* flowers) is an old medical name for sloe flowers. See *illus.*, FLOWERS, vol. VI.

ACADEMUS, a hero of Athens, whose name is said to be perpetuated in 'Academy' or "Academia," the grove in which Plato established his school.

ACADEMY, a name originally applied to the philosophical school of Plato, and derived from the place in which that philosopher was accustomed to meet and converse with his pupils. This was a garden or grove in the suburbs of Athens, said to have once belonged to the hero Academus, and by him to have been presented to the citizens for a gymnasium. The spot is at this day known under the name of *Akadimía*. The variations of doctrine among the successors of Plato gave rise to the distinctive titles of *Old*, *Middle*, and *New A.* The first is applied to the philosophic teaching of Plato himself and his immediate followers; the second, to that modification of the Platonic philosophy taught by Arcesilaus (q.v.); and the third, to the half-skeptical school founded by Carneades (q.v.).

In its common English acceptation, the word academy is loosely applied to any species of school which professes to communicate more than the mere elements of instruction. This, however, though perhaps more in affinity with the original application of the term, must be regarded as an abuse of its more general and strict acceptation in modern usage, as signifying a society of savants or artists, established for the promotion of literature, science, or art. The first institution in ancient times that seems to merit the name, in this sense, of academy, was the celebrated *Museum* founded at Alexandria in the 3d c. B.C. by Ptolemy Soter, which concentrated in that intellectual capital all that was most eminent in science, philosophy, poetry, and criticism. After this model, the Jews, and, at a later period, the Arabians, founded numerous institutions for the promotion of learning. During the middle ages, with the exception of the Moorish institutions at Granada and Cordova, in which poetry and music formed prominent subjects of study, we find nothing corresponding to the modern idea of an academy, save the learned society established in his own palace, at the suggestion of his teacher Alcuin, by Charlemagne. This association was dissolved by the monarch's death; and not till the middle of the 15th c., when the conquest of Constantinople drove many learned Greeks to seek an asylum in Italy, do we find any trace of a similar institution. Under the enlightened patronage of Lorenzo and Cosmo de' Medici, the lovers of Greek learning and philosophy were united in the bond of a common pursuit, and zealously labored to revive the long extinguished light of classic literature. After the decline of the Greek and Platonic academies of Florence, there arose institutions of a more comprehensive character, the example of which spread from Italy throughout all the states of Europe.

Academies may be divided into those established for general ends, and such as contemplate specific objects. The members are usually classified as *Ordinary*, *Honorary*, and *Corresponding*. The results of their labors in their various departments are reported at the periodic meetings, and printed in the records of the academy. Prizes are generally established as the rewards of distinguished merit in original discovery, or excellence in the treatment of subjects proposed for competition. Among general academies, deserving of mention in the first place is the *A. of Sciences*, at Paris, established by Colbert in 1666, and now a branch of the *Institut de France* (see INSTITUTE). The first scientific academy founded in modern times was the *Academia Secretorum Naturæ*, established at Naples in 1560, and afterwards put down by a papal interdict. It was succeeded by the *A. of the Lincei*, founded at Rome by prince Cesi, which attained distinguished success. Galileo was one of its members. Subsequently arose the *A. del Cimento*, at Florence, and the *A. degl' Inquieti*, of Bologna, afterwards incorporated into the *Accad. della Traccia*, and finally, in 1711, merged in the Institute of Bologna, or Clementine A.—The *Berlin A. of Arts and Sciences*, founded in 1700 by Frederick I. was in 1710 divided into four sections: 1. Physics, medicine, and chemistry; 2. Mathematics, astronomy, and mechanics; 3. German language and history; 4. Oriental literature, in special connection with missions. The first president was Leibnitz, whose extraordinary versatility of genius qualified him for a leading place in all its departments. Under the great Frederick, new life was infused into the academy by the encouragement offered to learned men of all countries to settle at Berlin. Maupertuis was now appointed president, and the academy was reorganized under the four classes of physics, mathematics, philosophy, history and philology. The public meetings are held twice a year. The transactions did not appear regularly till after 1811. They were formerly published in French, but

now in German.—The *Imperial A. of Sciences of St. Petersburg* was planned in 1724 by Peter the great, with the advice of Leibnitz and Wolf. It was established in the following year by Catherine I., and liberally supported by the empress: fifteen members received pensions as professors of various branches. Of these were Wolf, Bülfinger, Nicolas and Daniel Bernouilli, and the two De Lisles. After various fluctuations, the academy attained a position of high eminence and utility under the patronage of Catherine II. Among the most important results of her liberality are the travels and researches of such men as Pallas and Klaproth. The academy is still composed of fifteen salaried members, besides a president and director, and four pensioned supernumeraries, who attend the meetings and succeed to the vacant chairs. It possesses an extensive library and a very valuable museum. The first series of its transactions (1725–47) bears the name of *Commentarii*; the second (1748–77), of *Novi Commentarii*; the third (1777–82), of *Acta*. Up to this date, they were written in Latin; thenceforth in Latin or French. From 1783 to 1795, they are called *Nova Acta*; from that time to the present they are entitled *Memoires*.—The *A. of Sciences at Stockholm*, founded in 1739, consisted at first of six members, one of whom was the celebrated Linnæus. It received a royal charter in 1741, but no endowment. Its publications, since 1779, are distinguished as *New Transactions*. Papers on agriculture are separately published, under the title of *Œconomica Acta*. In 1799, it was divided into six classes: 1. Political and rural economy, 15 members; 2. commerce and mechanical arts, 15; 3. Swedish physics and natural history, 15; 4. foreign physics and natural history, 15; 5. mathematics, 18; 6. history, philology, and fine arts, 12. The resident members preside in rotation, during a term of three months: the transactions appear quarterly. At the annual meeting in April, prizes are distributed.—The *Royal A. of Sciences at Copenhagen* owes its origin, like the last mentioned, to six learned men, employed by Christian VI. in 1742 to arrange his cabinet of medals. In 1743, the king, on the recommendation of count Holstein, their first president, took the academy under his protection, endowed it, and ordered that natural history, physics, and mathematics should be embraced within the sphere of its operations, at first limited to the national history and antiquities. The academy's transactions are in Danish; some of them are translated into Latin.—The *A. of Sciences of Mannheim* was founded in 1755 by the elector-palatine Karl Theodor, and divided into the sections of history and physical science; the latter was subdivided in 1780 into physics proper and meteorology. The transactions under the two former heads are published under the title of *Acta*; the meteorological memoirs are entitled *Ephemerides*.—The *A. of Sciences of Munich* was founded in 1759. Soon after the erection of Bavaria into a kingdom, it was reorganized on a very extensive footing, under the presidency of Jacobi. Its memoirs are published under the title of *Abhandlungen der Bayerischen Akademie*.—The *A. of Lisbon*, established by queen Maria in 1779, numbers 60 members, viz., 24 ordinary, and 36 honorary and foreign; and is divided into three sections: 1. natural science; 2. mathematics; 3. Portuguese literature. It is liberally endowed by government, and has a library, museum, observatory, and printing-office. Its *Memorias* have appeared since 1787. The *Royal Irish A.* dates its origin from 1782, when a number of gentlemen, chiefly connected with the university of Dublin, associated themselves for the pursuit of science, history, and literature. The plan of the society was afterwards extended. The first volume of its transactions appeared in 1788.—The *American A. of Arts and Sciences* was established at Boston in 1780: it had previously existed in another form, the original institution being due to Franklin. The first volume of its transactions was published in 1785.—The *A. of Sciences at Vienna* was founded in 1846. It is divided into the sections of history and philology; mathematics and natural science; philosophy, political economy, and medicine. It published *Reports* of its meetings since 1848, and since 1850, *Memoirs*.

Among the academies established for the cultivation of particular departments of knowledge, are the following: 1. **LANGUAGES.** The *Accademia della Crusca*, or *Accademia Furfuratorium*, was founded at Florence in 1582, chiefly for the purpose of promoting the purity of the Italian language; whence its somewhat fantastic designation—*crusca* signifying chaff or bran. It first drew attention by its attacks on Tasso. Its principal service has been the compilation of an excellent dictionary, and the publication of correct editions of the older Italian poets. A new edition of this dictionary is at present in preparation, but from the slow rate of its progress it is calculated that many centuries must elapse before its completion. For an account of the *Académie Française*, instituted in 1629, see **INSTITUTE OF FRANCE**.—The *Royal Spanish A.* was founded at Madrid in 1714, by the duke of Escalona, for the cultivation and improvement of the national language, in which it has done good service, particularly by the compilation of a Spanish dictionary. A similar institution was founded at St. Petersburg in 1783, and afterwards united to the Imperial A. At Stockholm, a similar academy was established in 1786; and at Pesth (for the cultivation of the Magyar language) in 1830.—2. **ARCHÆOLOGY.** At the head of antiquarian institutions stands the *Académie des Inscriptions*, founded at Paris in 1663. See **INSTITUTE OF FRANCE**. For the elucidation of northern languages and antiquities, an academy was founded in 1710 at Upsala, in Sweden; a similar institution was established at Cortona, in Italy, in 1727. Both have issued valuable works. The *A. of Herculaneum* was founded at Naples in 1755, by the marquis of Tanucci, for the elucidation of Herculanean and Pompeian antiquities. Its publications, commencing

in 1775, bear the title of *Antichità di Ercolano*. An academy for the investigation of Tuscan antiquities was established at Florence in 1807; and at Paris, in 1805, a Celtic A. for the elucidation of the language, history and antiquities of the Celts, especially in France. This society changed its name, in 1814, to *Société des antiquaires de France*.—3. HISTORY. The *Royal A. of Portuguese History* was founded at Lisbon, in 1720, by John V. At Madrid, in 1730, a learned association was formed for the elucidation of Spanish history. It was constituted an academy in 1738, by Philip V. It has published editions of Mariani, Sepulveda, Solis, and the ancient Castilian chronicles, some of which had never before been printed. A historical academy has existed for some time at Tübingen.—4. MEDICINE. The *Academia Naturæ Curiosorum* was established at Vienna, in 1652, by the physician Bauschius, for the investigation of remarkable phenomena in the animal, vegetable, and mineral kingdoms. In honor of Leopold I., who patronized it liberally, it took the additional name of *Cæsareo-Leopoldina*; and, since 1808, has had its chief seat at Bonn. Its valuable memoirs have appeared at irregular intervals under the title of *Miscellanea, Ephemerides, and Acta*. The *Académie de Médecine* of Paris was founded in 1820, for the prosecution of researches into all matters connected with the public health, such as epidemics, etc. The *Surgical A. of Paris* (whose functions have partly descended to the preceding) was founded in 1731. It was dissolved during the troubles of the first revolution. The *Vienna A. of Surgery*, established in 1783, is, properly speaking, a college.—5. FINE ARTS. The academies of painting and sculpture of St. Petersburg (connected with the Imperial A.) and Paris are institutions for the education of pupils. The French *Académie des Beaux Arts* is a branch of the Institute (q.v.). The *Royal A. of Arts* in London was founded in 1768, for the promotion of the arts of design, painting, sculpture, etc. The number of academicians is 40. Connected with it is a school, with professors selected from among the academicians. The annual exhibition of the academy is open to all artists of merit. The *Royal Scottish A.* of painting, sculpture, and architecture, was founded at Edinburgh in 1826, and received a royal charter in 1838. The number of academicians is 30; the general plan of the institution is similar to that of the London A. Similar to these also is the *Royal Hibernian A.*, incorporated at Dublin in 1803. Numerous academies of the fine arts have been established in Italy—at Rome, Milan, Turin, Florence, Mantua, and Modena; as also at Madrid, Vienna, and Stockholm.

Many learned societies differ from academies only in name; such as the Royal Society of London, the British Association, the Washington Smithsonian Institution, etc., etc.

The use of the word academy is somewhat arbitrary in this country; in some quarters there seems to be a tendency to limit the name, as in England, to associations for promoting the arts, a tendency which is shown in the fact that many of our largest scientific associations have shunned the title. On the other hand, popular usage has extended the name to primary schools and (following a Parisian innovation) even to opera houses. The first learned society established in this country in imitation of the European academies of science was the American philosophical society of Philadelphia, which Benjamin Franklin founded in 1744. It soon languished and died, but was revived in 1767, and is to-day in a flourishing condition. The American A. of science and arts in Boston ranks next in date. It was incorporated in 1780. Many of its published memoirs and proceedings are of great value. The A. of natural sciences in Philadelphia (organized in 1812) has a remarkably fine museum and the finest collection of books on natural history in America. The national A. of science was incorporated at Washington in 1863 for the purpose of considering all scientific questions submitted to it by the government. The membership was originally limited to 50, selected from the prominent scientists of the country, but now comprises nearly a hundred. The Smithsonian institution (q.v.) is in many respects the most important of American scientific associations, and its museum is only surpassed by a few of the largest European collections. The two chief academies devoted exclusively to the fine arts are the Pennsylvania A. of fine arts in Philadelphia (established 1807) and the New York A. of design (1828). Both academies maintain a flourishing school of design, and give exhibitions annually.

ACADIE. See NOVA SCOTIA.

ACALEPHÆ (Gr. "nettles"), a term given by Aristotle to the jelly-fishes or *medusæ* and their allies, in allusion to their stinging propensities. As in all other *cœlenterate* animals, the urticating or stinging properties of such forms reside in the *cnidæ* or "thread-cells," with which the tissues of their bodies are provided. These cells consist each of a sac or vesicle, containing fluid and a thread-like filament; the cell rupturing on being pressed or otherwise irritated, and emitting the thread and fluid. The former must act mechanically as a kind of dart; whilst the fluid acts chemically in producing irritating effects by its injection into the wound made by the filament. Some of the forms allied to the jelly-fishes, and included under the old term *acalephæ*—such as the *physaliæ* or "Portuguese men-of-war"—sting, by means of these cells, so severely that the effects on the human subject may persist for days or even weeks.

In modern zoology, it may be noted, the term *acalephæ* is now generally abolished. Formerly, this name was given to a group of *cœlenterate* or radiate animals, represented by the true *medusæ* or jelly-fishes, and also by the *lucernarida*; whilst older systems still, included in the group *acalephæ* other oceanic organisms (*calycophoridae*

and *physophoridae*) among which were the "Portuguese man-of-war," etc., and also the order *ctenophora* (*beroë*, *cestum veneris*, etc.), this latter order being now removed to a class superior to that of the jelly-fishes and their allies. In modern systems of zoological classification, therefore, the old division of the acalephæ is represented by at least two distinct orders of cœlenterate animals. Thus the true jelly-fishes or medusidæ constitute the sub-class *discophora* ("disk-bearers"), and are distinguished by being free-swimming forms; the body in each consisting of a single organism, and being composed of a clear gelatinous swimming-bell or *nectocalyx*, from the roof of which the mouth is suspended; whilst throughout the substance of the bell-shaped body a system of *radial* and *circular* canals is distributed. These organisms, familiar to every sea-side visitor, swim gracefully by contracting and expanding their clear jelly-like bodies; the aperture or mouth of the bell being generally closed or protected by a membrane named the *veil* or *velum*. Around the margin of the bell *auditory sacs* or hearing-organs are found; and pigment-spots or *ocelli* existing in the same situation are believed to represent rudimentary eyes. Tentacles or organs of touch are also developed, and may depend from the margins of the bell. See *illus. INVERTEBRATES*, vol. VIII.

ACANTHA-CÆE, an order of monopetalous-exogenous plants, with didynamous stamens, and a 2-lipped corolla; its lobes imbricated in the bud. The seeds grow from hooks on the placenta. A large family; but with few genera in the United States.

ACANTHAS-PIS, a genus of buckler-headed fishes in Ohio limestone, resembling *cephalaspis*; the buckler bears similar denticulated spines; the cranial plates are covered with vermicular ornamentation, and not firmly fastened together.

ACANTHOPTERYG-II, in zoology, one of the two primary divisions of the *osseous fishes* in the system of Cuvier, distinguished by having spinous rays in the first portion of the dorsal fin, or in the first dorsal if there are two. The name is derived from the Greek *akantha*, a thorn, and *pteryx*, a wing. The A. are divided by Cuvier into fifteen families, amongst which are *percidæ* (perch, bass, etc.), *triglidæ* (gurnard, flying-fish, etc.), and *scomberidæ* (mackerel, tunny, etc.).

ACANTHU'RUS CHIRURGEON, or SEA-SURGEON, named from a sharp-pointed, keen-edged and movable spine in the side of the tail, which cuts like a lancet. The scales are small; its food is vegetable; it is found on Atlantic coasts of tropical America.

ACANTHUS, the name given by the Greeks and Romans to the plants sometimes called brancursine, of which it is also the botanical generic name. *A. mollis* and *A. spinosa*, natives of the south of Europe, are the species best known. The twining habit of the plants, their large white flowers, and, above all, the beautiful form of their dark and shining leaves, have led to their artistical application, especially in the capitals of Corinthian columns. See COLUMN; CORINTHIAN ORDER. Roman drinking-cups have been found whose handles are twined with A. leaves.—The ancients made the *A. mollis* chiefly their pattern; but in Gothic ornaments more use is made of the smaller and less beautiful leaves of *A. spinosa*.

The genus A. is the type of the natural order ACANTHACEÆ, which contains nearly 1400 known species. They are herbaceous plants or shrubs, chiefly tropical; dicotyledonous. The greater part are mere weeds, but the genera *justicia*, *aphelandra*, and *ruellia* contain some of our finest hot-house flowers. The leaves are opposite, rarely in fours, simple; two or three bracts, which are often large and leafy, accompany each flower. The calyx is persistent, usually 5-leaved, occasionally cut into many pieces, sometimes obsolete. The corolla is monopetalous, hypogynous, usually irregular, deciduous. The stamens are generally two; sometimes four, didynamous, the shorter ones sometimes sterile; the anthers $\frac{1}{2}$ -celled, opening lengthwise. The disk is glandular; the ovary free, 2-celled, with two or more ovules in each cell; placenta adhering in the axis; style one. The fruit is a capsule, bursting elastically with two valves, the dissepiment also separating into two pieces through the axis. The seeds are roundish, hanging by hard, usually hooked processes of the placenta; testa loose; albumen wanting; embryo curved or straight; cotyledons large; radicle subcylindrical, next the hilum.

A CAPELLA (Italian), in the church style, for voices without accompaniment. The term is also used when instruments accompany voices in octaves or unison without independent parts; and as an indication of time, in which case it is equivalent to *Allu breve* (q. v.).

A CAPRICCIO (Italian), at the caprice or pleasure of the performer, regarding both time and expression.

ACAPUL'CO, the best harbor belonging to Mexico in the Pacific, and a place of considerable commercial importance; situated in lat. 16° 50' n., long. 99° 48' w. The harbor is so well sheltered that deeply laden vessels may lie safely at anchor close to the granite rocks. The t., defended by Fort Diego, on an eminence, has a very unhealthy site, and is one of the places most frequently visited by cholera, which proves especially fatal to new settlers. The population is composed of pearl-fishers, sailors, and husbandmen. The

chief exports are cochineal, indigo, cocoa, wool and skins; the imports are cottons, silks, spices, and hardware. Pop. about 5000.

ACARNANIA, a country of ancient Greece, separated from Epirus on the n. by the Ambracian gulf, now the gulf of Arta; from Ætolia on the e. by the river Achelôus; and washed s. and w. by the Ionian sea. Along with Ætolia, it forms one of the *nomes* or departments of the modern kingdom of Greece. The w. part of A.—from the mouth of the Achelôus or Aspropotamo to cape Actium in the n.w.—is occupied by a mass of rocky and thickly-wooded mountains, rising abruptly from the indented coast, and culminating in the summit of Berganti. A considerable part of A. is overgrown with wood—a rare feature in modern Greece. There is no t. of importance in the whole district, though naturally it is not destitute of resources.

ACARUS, a genus of *arachnides* (q.v.), of the order *trachearia*, the type of a tribe called *acarides*, which corresponds with the genus *acarus* as defined by Linnæus. The species of the acarides are very numerous. All of them are small; many microscopical. Some are familiar to us under the names of mites (q.v.), ticks (q.v.), etc. Some live upon the juices of plants; some in the dung of animals; many species are found in the vegetable and animal substances used for human food, especially when these have been kept for a considerable time, as in cheese, flour, sugar, on the surface of preserves, of dried fruits, etc.; others are parasites upon the bodies of animals, particularly in diseased conditions, as in cases of itch. A minute species has been detected in the follicles of the human skin, and others even in the human brain and eyes. Some insects, particularly beetles, are often covered with acarides. A species (*trombidium holosericeum*) common in gardens in spring is remarkable for its blood-red color; and a nearly allied but much larger species (*T. tinctorum*), found in the East Indies, yields a fine dye. A Persian species (*argas persicus*) is poisonous and causes sores. The bite of many species is annoying, as of the common harvest-bug (*leptus autumnalis*). The acarides have eyes. Some of them have the mouth furnished with mandibles, others with a sucker. They are oviparous, and extremely prolific. They have generally eight legs; but, when young, many of them have only six, and in some genera the additional pair seems never to be acquired. A few are aquatic, and have legs covered with hairs to adapt them for swimming. See *illus.*, CRUSTACEANS, ETC., vol. IV.

ACARUS FOLLICULORUM is the most generally accepted name for a microscopic parasite residing in the sebaceous sacs and hair follicles of the human skin. It is also known as the *demodex folliculorum*, the generic name being derived from the Greek words *demos*, lard, and *dēx*, a boring worm. It was first described by Dr. Simon of Berlin in 1842, under the title of *acarus folliculorum*, which was suggested by the eminent zoologist, Erichsen of Berlin. In the following year, Mr. Erasmus Wilson made it the subject of an elaborate memoir, which appeared in the *Philosophical Transactions*, in which, as there are doubts as to its exact zoological position, he simply terms it the *entozoon folliculorum*. According to professor Owen, who gave it the name of *demodex*, it represents the lowest form of the class *arachnida*, and makes a transition from the *annelids* to the higher *articulata*. As regards the size and form of these animals, there is much variety; they pass their whole existence in the fatty matter of the sebaceous cells, moulting repeatedly during their growth, and being finally expelled from the follicles with the secretions of these organs. Their presence has no reference, according to Mr. Wilson, to disease of the skin or of the follicles. They are met with in almost every person, but are most numerous in those in whom the skin is torpid, in invalids, and in the sick. They vary in length from $\frac{1}{60}$ th to $\frac{1}{100}$ th of an inch, and the accompanying figure represents the magnified parasite. Their number is various; in some persons not more than two or three can be found in a follicle, while in others Mr. Wilson has seen upwards of fifteen. The head is always directed inwards, and when a number are present they seem to be collected into a conical bundle, the larger end of the cone being formed by their heads. The situation in which they are most commonly found is the skin of the face, and particularly that of the nose, but they have also been met with in the follicles of the back, the breast, and the abdomen. As far as we know, they are never found on the limbs.

A reference to the figure shows that the animal possesses eight thoracic appendages (c, c) of the simplest and most rudimentary kind, each of which is terminated by three short setæ. The integument of the abdomen is very finely annulated. The mouth is suctorial or proboscidiform, consisting of two small spine-shaped maxillæ (b), and an extensive labium capable of being elongated or retracted; it is provided on each side with a short, thick, maxillary palp (a, a), consisting of two joints with a narrow, triangular labrum above. The sexes are distinct, but the differences between the male and female are not well recognized. Ova are frequently seen, both in the body of the female and in detached discharged masses. Any of our readers may readily observe their own *acari* by collecting between two pieces of thin glass the expressed fatty matter from a nasal follicle, and moistening it with a drop of olive oil. Very similar if not identical animals have been found in the contents of the pustules of mangy dogs.



Acarus folliculorum, magnified.

ACAS'TUS, a son of Pelias, king of Iolcus; one of the Argonauts and of the Calydonian hunters. He revenged the murder of his father (killed by his daughters at the instigation of Medea) by driving Jason and Medea out of Iolcus.

ACATHISTUS, a hymn sung in the ancient Greek church in honor of the Virgin.

ACCAD, a city of Babylonia. It has been identified with Nisibis. Rawlinson supposes Accad to be the name of the primitive Hamite race of that country.

ACCELERANDO (Ital.), in music, with gradually increasing velocity of movement.

ACCELERATED MOTION, in mechanics, is motion in which the velocity is continually increasing. When the increments of velocity are equal in equal times, the motion is said to be *uniformly* accelerated. The best example of such a motion is that of a falling body. It is found that near the earth's surface a body, descending from a state of rest, falls $16\frac{1}{2}$ ft. in the first second. Now a little consideration will show that at the end of the first second it is moving at the rate of $32\frac{1}{2}$ ft. per second. For since the velocity was nothing at first and increased uniformly, $16\frac{1}{2}$ ft. must have been the *mean* velocity—i.e., the velocity at the middle of the time; and therefore the velocity at the end must be double, or $32\frac{1}{2}$ ft.: $32\frac{1}{2}$ ft. is thus the measure of the accelerative force of gravity. At the end of the second and third seconds the velocity is found to be doubled, trebled, etc., or $64\frac{1}{2}$, $96\frac{1}{2}$ ft.

ACCELERATION OF THE MOON. It was first observed by Halley that the time of the moon's revolution round the earth has for several thousand years been decreasing, or her velocity has been increasing. This phenomenon remained for a considerable time inexplicable; at last, Laplace, in 1787, discovered the cause in the varying eccentricity of the earth's orbit, which has been on the decrease since about 12,000 years B.C. Since that time the moon has been gradually coming nearer to the earth; and this will go on till 36,900 after Christ, when the eccentricity of the earth's orbit will begin again to increase.

ACCENT, in grammar, is a special stress of voice laid upon one syllable of a word, by which it is made more prominent than the rest; the accented syllable is sometimes indicated by a mark, as *awa'y, fo'ttify*. Every word in English has one syllable thus brought markedly into notice. When the accented syllable falls near the end of a long word, there may be one or more secondary accents, as in *re'commen'd, subo'rdina'tion*. A. depends upon force of vocal or articulative effort, not upon highness or lowness of pitch. Variations of pitch produce what elocutionists call *inflection*. It is the confounding of A. with a rise of tone, and the contrasting of it with a sinking of tone, that has produced so much confusion on this subject, especially as regards the accents of the ancients. In English, many nouns are converted into verbs simply by transposing the A., as *o'bject—obje'ct*. It is A., and not quantity, that determines English measures or metres in versification. No rule can be given as to what syllable of a word shall be accented. There seems to be an increasing tendency in our language to throw the A. towards the beginning of words. In the Finnish language, the A. is said to be invariably on the first syllable.—*Emphasis* is to sentences what A. is to words; it is a stress laid upon one word of a sentence to make it prominent. If A. is syllabic emphasis, emphasis is logical A.

ACCENT, in music, is analogous with A. in language. It consists of a stress or emphasis given to certain notes or parts of bars in a composition, and may be divided into two kinds—grammatical, and rhetorical or æsthetic. The first kind of A. is perfectly regular in its occurrence—always falling on the first part of a bar. It is true that long or compound measures of time have, besides the chief A. in every bar, some subordinate accents; but these are only slightly marked. As a general rule, we may observe that the grammatical or regular A. must not be exaggerated. It should be marked only so far as to give a clear sense of rhythm. The æsthetic A. is irregular, and depends on taste and feeling, exactly as does the A. and emphasis used in oratory. In vocal music well adapted to words, the words serve as a guide to the right use of æsthetic accents.

ACCENT'OR. See HEDGE SPARROW.

ACCEPTANCE is a formal agreement to pay a bill when legally due, applied usually to bills of exchange. There is no fixed time within which a bill must be presented for A., but usage prescribes as early a time as may be reasonably convenient, so that the acceptor may know when it becomes due. When a bill is drawn upon one's self, or by a partner in a firm upon that firm, or by an officer of a corporation upon such corporation, no A. is needed. When a bill is upon a firm, presentation for A. may be made to any of the partners; if to be accepted at a bank, it must be presented within the usual bank hours; or to a man of business at his place of business within the customary business hours. An A. may be either conditional, qualified, or complete; it may be in writing or oral, where no law to the contrary exists; it may be before or after the drawing, or after it is due; it may be by the maker of the bill, or by anybody who chooses to protect the paper. The common usage is to accept by writing on the bill itself the word "accepted," or more generally the mere signature of the acceptor suffices. The law of N. Y. requires A. in this form, and if the party refuses to sign his name the bill is subject to protest. Destroying a bill or refusing to return it within one day, whether accepted or not, is held to be equivalent to accepting. Where A. is given with conditions, the drawer of the bill should be apprised of and satisfied with such conditions. To prevent loose

A. the statute of N. Y. requires that no one shall be charged as accepting unless his promise in writing to accept, although made before the bill is drawn, is in fact an A. in favor of any one who took such bill for value, on the faith of such promise in writing. It has been held that authority in writing or by telegraph to draw on a person is equivalent to that person's A. of the bills drawn; also that a letter of credit conferring authority on the holder to draw upon the author of the letter is equivalent to a promise in writing to accept the bills drawn. An A. is an admission of the signature of the drawer; so if the signature be forged, the acceptor is liable to the holder, presuming the latter to be innocent. Where A. is refused, the holder must satisfy the drawers and endorsers if he wishes to hold them, though failure to notify may not imperil the holder's action against them if it shall appear that no injury has been sustained by them in consequence of such failure; still the presumption is in their favor, and the burden of proof is on the holder. Foreign bills are protected in official form. This is not necessary in the case of home bills, unless where required by special statutes.

ACCES/SORY. An accessory before the fact is one who participates in the act; an A. after the fact, one who intentionally gives aid, comfort or protection to a felon of whose guilt he is aware. Perpetrators of crime may be principals in first or second degree; one not present who counsels or procures a crime to be committed is accessory before the fact. If the instigator gave such advice in presence of the actual offender, he would be himself a principal. In case of murder all present who aid or abet the killing are principals; but if two men fight to kill one another, and the bystanders, ignorant of such intent, join in and one is killed, they are not guilty of murder. But if one conspires with another to do a murder, and himself keeps watch against surprise or escape, the act of watching makes him a principal, for he is constructively present, though he may not see the deed done. If A tells B to whip C, and B does so, B is principal and A accessory before the fact. If A tells B to commit a crime, and B commits a different crime, A is not accessory in any way; but if B in trying to do A's request kills the wrong person, A would be accessory before the fact. Recent statutes provide that a person procuring a crime to be done shall be punished the same as the principal. In N. Y. the accessory before the fact may be tried and punished, though the principal may have been pardoned or discharged before conviction; and so in Massachusetts, if the principal be not amenable. There, too, the aider and abettor, who in common law would have been a mere accessory, may be indicted and convicted of a felony without regard to indictment or conviction of the principal. Most of the states have similar statutes.—An accessory after the fact is one who, knowing the guilt of a felon, whether principal or accessory before the fact, receives, protects, or assists him; but it should probably be added, "with intent to hinder his trial, conviction, or punishment." Merely allowing a felon to escape, or ministering to his physical necessities, will not make one an accessory. Once the common law did not except any who aided in an escape unless a wife who aided her husband; but modern statutes are less rigid, or more liberally construed. In Massachusetts the statute excepts from criminal blame as accessory such relations as parent or grandparent, child or grandchild, and brother or sister to the offender, and similar laws prevail in most of the states, at least in practice.

ACCIAJUO'LI, DONATO, 1428-78; famous for learning in Greek and mathematics, and for services to Florence, his native state. After filling several important embassies, he became gonfalonier of Florence in 1473. Five years afterwards he died at Milan while on his way to Paris to ask the aid of Louis XI. on behalf of the Florentines against Pope Sixtus IV. He died poor, and his daughters were adopted by his fellow citizens. A. wrote commentaries on Aristotle's *Ethics* and *Politics*, and translated some of Plutarch's *Lives*. He also wrote the lives of Hannibal, Scipio, and Charlemagne.

ACCIDENT, in law, an unforeseen event, loss, act, or omission, not the result of negligence or misbehavior in any of the parties; such as the loss of negotiable or other papers; or where some part of a document has been omitted, in which case the court can require its insertion. In penalties and forfeitures, where the injury caused by omission of duty can be reasonably compensated, as in case of failure to pay rent on a given day, the court may relieve the offending party against the penalty of forfeiture. Where there has been neglect or omission through want of information or through negligence to defend a suit, the court may permit the proper steps to be taken. But as a rule a court will not interfere in favor of a mere volunteer; so if a seal should be omitted from a conveyance made without consideration, or a clause should be left out of a will, no relief would be extended. It is also ruled that no relief will be granted against a purchaser who has acquired legal rights in good faith for a consideration of value.

ACCIDENTAL COLORS. See **LIGHT.**

AC'CIDENTS, in music, occasional sharps, flats and naturals placed before notes in the course of a piece.

ACCIDENTS, in logic, are opposed to essentials, or to substance. An accident is a property of an object which may be modified, or even be altogether abstracted, without the object's ceasing to be essentially what it is. But many of the distinctions made by the older philosophers between accidental and essential are fallacious.

ACCIPITRES (plural of the Lat. *accipiter*, a hawk), the name given by Linnæus to an order of birds, including, according to his system, the genera *vultur* (vultures), *falco* (eagles, falcons, hawks, etc.), *strix* (owls), and *lanius* (shrikes), and principally distinguished by a hooked bill, short strong feet, and sharp hooked claws. The name has not generally been adopted by subsequent ornithologists, but the order, as a truly natural one, has been retained under the names *rapaces*, *raptores*, etc.; the shrikes, however, being generally excluded from it.

ACCLAMATION, an expression of opinion of any assembly by means of the voice. Among the Romans A. was varied both in form and purpose. At marriages the spectators would shout "Io Hymen," "Hymenæe" or "Talassio." A victorious army or leader was greeted with "Io triumphe." In the theater approbation for the play was asked by the actor speaking the closing words, who added "Plaudite." In the senate opinions were expressed and votes passed in such forms as "Omnes, omnes," "Æquum est," "Justum est," etc.; and the praises of the emperor were celebrated in certain prearranged sentences which seem to have been chanted by the whole body of senators. At first the A. which greeted the works of poets and authors recited in public was genuine; but the modern *claque* was early introduced by rich pretenders to literary ability who kept paid applauders not only for themselves but lent them to their friends. Nero gave a specimen when he caused 5000 soldiers at a given signal to chant his praises in the theater; the soldiers were called "augustals," and were conducted by a regular music-master. In the early times of the Christian church it was not uncommon for a congregation to express their approbation of a favorite preacher during the course of his sermon; and in this manner Chrysostom was frequently interrupted. In ecclesiastical councils voting by A. is very common, the question being usually put in the form "placet" or "non-placet." In other assemblies A. is expressed by "ay" or "agreed."

ACCLIMATE, to accustom an animal or plant to a climate not natural to it. The process, of course, varies widely, according to the amount of difference between the old and the new climate. In cases where the difference is extreme, important changes take place in the constitution, and are often attended with certain diseases described as "diseases of acclimatization." Thus, Europeans settling in tropical parts are liable to disease of the liver, while natives of tropical lands, when resident in England, are exposed to pulmonary disease. The power of bearing changes of climate is greatest in the Anglo-German race, and usually bears a direct ratio to the intellectuality of a race. Civilized people display greater ingenuity and strength of will than savages in accommodating themselves to changes of climate, by making careful corresponding changes in their mode of life. Ulloa and Humboldt assert that persons of and above middle age best stand transportation to tropical climates. Among animals, we find great powers of adaptation to various climates in the horse, dog, cat, rat, etc.; and among plants, in the various cereals, in potatoes, and several weeds common to almost all climates; but there seems to be a limit to the power, at least as seen in the individual. To A. beyond a certain point is the work of some few generations. Almost all the domestic animals now commonly spread over Europe, and even in high northern latitudes, were originally natives of warm climates. The change produced by the acclimatizing of animals may be either an improvement or a deterioration; of the latter, we have an instance in the Shetland pony; of the former, we see an example in the merino sheep of Spain. As an instance of want of the faculty of being acclimatized, the reindeer may serve. Removed from the cold north to the fertile valleys of a temperate clime, the reindeer degenerates and dies. On the other hand, the horse, whose native land is the east, arrives at its highest development in England; and the Syrian sheep, brought northwards as far as Spain, becomes remarkable for its fine fleece. Spain, on the whole, has a climate much warmer than that of Silesia and Pomerania; and yet the merino sheep, bred in these countries, have become superior to their ancestors imported from Spain. This is a proof that art may do very much in modifying the influences of climate. Silk-worms, brought from China first into Italy, have been acclimatized not only in the s. of France, but even on the coast of the Baltic. Recently, attempts have been made to A. in France the llama, the vicugna, and the alpaca of Peru, and with some success in the last instance, as alpacas have been found to thrive pretty well in the Pyrenees. It has been very generally believed that plants may become gradually inured to a climate so different from that to which they have been accustomed, that if they had been at once transferred to it, they would have perished. On the other hand, it is maintained that each species of plant has certain limits of temperature within which it will succeed, and that alleged instances of acclimatizing have been merely instances of plants formerly supposed to be more delicate than they really were. But as it is certain that different varieties of the same species are often more or less hardy, it would seem that in the production of new varieties by seed, there is still a prospect of the acclimatizing, to a certain extent, of species of which the existing varieties are too delicate to grow well in the open air. Of late years numerous acclimatization societies have been formed, the best known being the Paris *Société d'Acclimatation*.

ACCOLADE, the term applied to the ceremony with which a knight was admitted into the order of chivalry. The grand-master, in receiving the neophyte, embraced him by folding the arms round the neck (*ad collum*).—In music, the A. is the couplet uniting several staves, as in part-music or pianoforte-music.

AC'COMAC, a co. in e. Virginia, on the Maryland border; 500 sq. m.; pop. '90, 27,277, with colored. The surface is level, and the soil moderately fertile, producing corn, oats, sweet potatoes, etc. Co. seat, Accomac.

ACCOMPANIMENT, a term applied to any subservient part, vocal or instrumental, added to a melody, or composition of many parts, to enrich the effect, or to support and sustain the voice. An accompaniment is said to be *Obligato* when it is an integral part of the composition, and *Ad libitum* when it can be either dispensed with or performed. The earliest accompaniment is found in the organ parts to services and anthems by the English composers of the sixteenth century. Dr. Rimbault, in his *Collection of Anthems by Composers of the Madrigalian Era* (London, 1845), says that, "All verse or solo anthems, anterior to the Restoration were accompanied with viols, the organ being only used in the full parts," and gives examples. Subsequently, harmonies were written down in figures, a practice that became known as *Figured* or *Thorough bass*, and here the accompanist was free to adhere strictly to the text, or to improvise. In the scores of the older masters, especially those of Handel and Bach, much is found which, if played exactly as written, would not reveal the intention of the composer. This is partly owing to the modern orchestra, which has taken the place of the organ, and which has increased the importance of the accompaniment. Many old compositions have been worked over by skilled musicians. Among the scores to which noteworthy additions have been made are those of Handel's (q.v.) *Messiah*, by Mozart (q.v.), and by Franz (q.v.); *Israel in Egypt*, by Mendelssohn (q.v.); and the great edition of Bach's works, by Robert Franz, for the Bachgesellschaft of Germany. The pianoforte accompaniment to songs has reached its perfection in the work of Robert Schumann and Robert Franz, which is elaborate, of endless variety in form and harmony, revealing poetic suggestions beyond the power of words to express. See **FIGURED BASS** and **SONG**.

ACCORAMBO'NI, VITTORIA, an Italian woman remarkable for her beauty and her tragical history. She was sought in marriage by Paolo Giordana Orsini, duke of Bracciano, who was supposed to have murdered his wife Isabella de Medici; but A.'s father gave her to Francisco Peretti, nephew of cardinal Montalto. The husband was assassinated in 1581, and the widow fled from her father-in-law's house to that of the duke of Bracciano. Pope Gregory XIII. opposed her marriage to the duke so far as to keep her a prisoner in the castle of St. Angelo nearly a year, but that did not prevent their union. Not long afterward the duke died, leaving nearly the whole of his fortune to the widow. This so incensed Ludovico Orsini, a relative, that he caused the widow to be murdered in her home in Padua, Dec. 22, 1585.

ACCOR'DION, a simple musical instrument, but little better than a toy, which produces its tones by the vibration of metallic tongues of various sizes, while wind is supplied by the action of bellows. The *concertina* and the *harmonium* are superior instruments, constructed on the same principle—the action of a gust of air on metallic tongues.

ACCOR'SO, FRANCIS, 1182-1260; a jurist of Florence, and professor and teacher at Bologna. He compiled in his work *The Great Gloss*, the substance of almost innumerable comments upon codes, digests, and institutes from previous writers. He disentangled with much skill the sense of many laws; but his ignorance of history and antiquities led him into many absurdities. His son Francis, also professor at Bologna, was invited to Oxford by Edward I. of England, and read lectures in the university in 1275-76.

ACCOUNT, a statement of receipts and disbursements; any statement of the condition of business, particularly with regard to financial affairs. In trade an A. current is one running or unsettled. Statements of A. are made at any time desirable, or at stated times, or on request, or demand. There is an action in law, seldom used, to compel the rendering of an A. by officers required to do so but neglecting the duty. In actions for A. both parties may be plaintiffs or defendants.

ACCOUNTANT, is an officer employed by railway companies, banks, etc., to take charge of their books and accounts, and to make out periodical statements and balance sheets. It is recognized as a special branch of business. Generally speaking, the work of an accountant may be classified under two divisions: (1) All those matters that involve the investigation of the books of a firm or company, with the making up of balance sheets, statements of all kind, and reports; and (2) the management of estates, whether of bankrupts or others.

AC'CRA, or **ACRA**, one of the chief towns of the West African gold coast, under the rule of England. Its population is estimated at 16,267, of whom only a few are Europeans. Crevecoeur, an old Dutch settlement, a mile east, was destroyed by the English in 1782, rebuilt in 1839, and ceded to England in 1872. The climate is salubrious.

AC'CRINGTON, a manufacturing town of England, in Lancashire, which has recently increased much in size and importance, lies in a deep valley, surrounded by hills, about 34 m. n.e. of Liverpool, and 13 m. e. of Preston, on the banks of the Hindburn. Pop., including Old A., '91, 38,603; '81, 31,435. Christ church is a fine gothic building, erected in 1838. The inhabitants are mostly employed in cotton factories, weaving, and calico-printing. A. is considered the center of the cotton-printing business. There are coal-mines in the neighborhood, in which many of the inhabitants find employment.

ACCT'BA'TION, the posture of Greeks and Romans at table. Their low tables were surrounded by couches on each of which usually three persons reclined, lying on the left side, the elbow or head on a pillow, the feet behind the next person. The middle was held to be the place of honor. Roman women deemed the position immodest, but finally adopted it; children and persons of mean condition were not permitted the custom.

ACCUM, **FREDERICK**, b. in Westphalia in 1769, went to London in 1793. He is known as an author chiefly on account of his work *A Practical Treatise on Gaslight*, which had the effect of introducing that method of illumination into London and all the large towns of England. It was translated into several languages, and became very popular. Subsequently, he wrote a book upon practical chemistry, which was well received, and one on the adulteration of food. Ultimately he became professor in an institution in Berlin, where he died in 1838.

ACCUMULATION OF POWER, the quantity of motion in machines at the end of given intervals, during which velocity has been constantly accelerated. A simple case is the rammer of a pile-driving machine, which descends by force of gravity in a certain time and falls upon some object. If the object does not move, the velocities of all the particles in the hammer, which had gone on increasing during the descent, are destroyed, and thus a shock is produced immensely greater than that which would result from the mere pressure of the hammer. The effect is directly proportional to the mass in motion, and to the square of the velocity at the instant of impact.

ACCUMULATOR. See **STORAGE BATTERY**.

ACCUSATIVE CASE. See **DECLENSION**.

ACEL'DAMA, a potter's field or working-place; said to have been bought by the Jewish priests with the money received by Judas for betraying Christ; afterwards set apart as a burial-place for strangers dying in Jerusalem. It is there shown, on the slope of the hills beyond the valley of Hinnom, s. of mount Zion.

ACEPH'ALA. Seq. **MOLLUSCA**.

ACEPH'ALOCYST, a cyst without a head, a hydatid growth, found in the liver, kidney or other abdominal organ of man, and sometimes of lower animals. It is a globular sac with walls of condensed albuminous substance and laminated texture; in its cavity is a colorless fluid with albuminous and gelatinous ingredients. Sometimes many secondary cysts grow from a main one. They are of parasitic nature, of the class of cestoids, of which the tape-worm is a familiar representative.

A'CER and **ACERA'CEÆ**. See **MAPLE**.

ACER'RA (anc. *Acerræ*), a town in south Italy, in the province of Caserta, nine m. n.e. of Naples, with which it is connected by railway. It was once fortified, but the walls are now crumbling into ruins. It has a cathedral and seminary. The country around is fertile, but extremely unhealthy, being afflicted with malaria, caused partly by the sluggish artificial channels called the Regj Lagni, the representatives of the *Clanvus non aquius Acerris* of Virgil; and partly by the flax-grounds, where the stocks are left to macerate. Pop. 15,000.

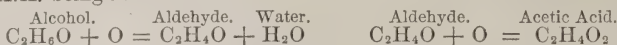
AC'ETAL, $C_2H_4(OC_2H_5)_2$, a colorless liquid, of an agreeable odor, and a flavor said to resemble that of the hazel-nut. It is one of the products of the slow oxidation of alcohol under the influence of finely-divided platinum, or of chlorine, or of dilute sulphuric acid and peroxide of manganese. Its specific gravity is .821, and it boils at 221° F. (105° C). It yields various reactions and products of interest in organic chemistry.

AC'ETATES, compounds of acetic acid with metallic bases. They are generally soluble in alcohol and water, and some are deliquescent; the least soluble are the acetates of mercury, silver, molybdenum, and tungsten. There are neutral, acid, and basic acetates. All acetates are destroyed at red heat or by sulphuric acid, the latter liberating acetic acid, easily recognized by its pungent odor. Heated with sulphuric acid and alcohol they produce acetic ether; with lime, acetone, which has a peculiar odor; distilled with caustic potash, they yield marsh gas. Their solutions yield a deep yellow color with ferric chloride, not given by free acetic acid. Acetates are much used in medicines and the arts; potassic acetate is prescribed for a diuretic; ammoniac acetate as a diaphoretic; plumbic acetate (sugar of lead) is an astringent. Acetates of aluminium, manganese, iron and zinc are used in calico-printing; acetate of copper (verdigris) mixed with arsenite of copper is used in wall-paper.

ACET'IC ACID, the sour principle in vinegar, is the most common of the vegetable acids. If alcohol, diluted with water, be mixed with a ferment, such as yeast, and exposed to the air at, or a little above, its ordinary temperature, it is rapidly converted into vinegar or A.A. The views held by Liebig regarding the part that wood-shavings, sand, ash, etc., play in condensing oxygen, and transmitting it to the alcohol, are now supplanted by those of Pasteur, who maintains that the true acetifying matter is a very minute mycoderma—a special vegetable organized being. It is impossible to conceive a more simple form of vegetation, consisting of extremely minute spores arranged in chains; each spore having a mean diameter not exceeding $\frac{1}{1700}$ th of an inch, and the length being about twice as great.

The rapidity of the development of these spores, under favorable circumstances, is almost inconceivable; and the power which they possess in fixing the oxygen of the air, and of transmitting it to the alcohol, and of establishing an incomplete combustion of the latter, is no less wonderful. A surface of a square yard covered with this plant is able, in the course of 24 hours, to fix the oxygen of more than 1000 quarts of air. The temperature of the surface of the fluid at which this slow combustion is proceeding is considerably raised, and often remains for several days at 21° or 25° F. (12° or 14° C.) above that of the surrounding air. The process which has just been described bears a very close analogy to the respiratory process, the oxygen of the air being in one case fixed by minute vegetable cells, and in the other by the blood corpuscles.

The change is accompanied by the absorption of oxygen, one atom of which combines with two of hydrogen to form water, aldehyde being left. Further oxidation then takes place, A.A. being formed thus:

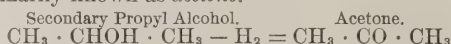


From the mode in which A.A. combines with bases to form salts, it is evident that one atom of the hydrogen differs from the other atoms in being replaceable by a metal or an alcohol radical (as ethyl C_2H_5), and on this account A.A. is called a monatomic acid, and its formula is usually represented as $\text{HC}_2\text{H}_3\text{O}_2$; that of acetate of potash being $\text{KC}_2\text{H}_3\text{O}_2$, and of acetate of ethyl $\text{C}_2\text{H}_5\text{C}_2\text{H}_3\text{O}_2$.

A striking experiment may be made illustrating the mode in which alcohol is converted into A.A. If slightly diluted alcohol be dropped upon *platinum-black*, the oxygen condensed in that substance acts with great energy on the spirit, and A.A. is evolved in vapor. Here the whole office of the platinum is to determine the oxygen of the air, and the hydrogen of the alcohol to unite. In the commercial processes for manufacturing vinegar, some vegetable substance containing nitrogen (one of the albuminous principles) takes the place of the platinum-black, and determines the same change. Pure A.A. is a crystalline solid at ordinary temperatures. It is obtained by distilling dry acetate of potassium and sulphuric acid: $2\text{KC}_2\text{H}_3\text{O}_2 + \text{H}_2\text{SO}_4 = 2\text{HC}_2\text{H}_3\text{O}_2 + \text{K}_2\text{SO}_4$.

The anhydride of A.A. (see ANHYDRIDES) is formed by the action of chloride of acetyl on acetate of potassium. It has the composition $(\text{C}_2\text{H}_3\text{O})_2\text{O}$, and unites with water to form A.A. The salts of A.A., called ACETATES, are numerous and important in the arts. The most important is acetate or sugar of lead. (See LEAD.) For the commercial processes of manufacturing A.A., see VINEGAR.

ACETONES, or **KETONES**, are the aldehydes of secondary alcohols (see ALCOHOL). Thus secondary propyl alcohol, when oxidized, loses two atoms of hydrogen, and gives dimethyl ketone, ordinarily known as *acetone*.



A series of such acetones is known, of which *acetone* is typical. It may be prepared by distilling acetate of calcium. It is a limpid liquid, having a taste like that of peppermint, and is readily soluble in alcohol, ether, and water. Its specific gravity is about 0.792, its boiling point being 132° F. (56° C.). It has recently been used in America for the manufacture of chloroform, which is obtained from it by distillation with bleaching-powder. It is a solvent for gums and resins, as well as for gun-cotton.

ACETYL, an organic radical not yet isolated; supposed to exist in acetic acid and its derivatives; the rational formula for acetic acid being on this hypothesis $(\text{C}_2\text{H}_3\text{O})\text{OH}$. See TYPES, CHEMICAL. The reason for assuming the existence of this radical in the acetic compounds is that the formula to which it leads affords the simplest explanation of the most important reactions of acetic acid. Thus, when acetic acid is treated with a metallic oxide or hydrate, the basic atom of hydrogen is replaced by a metal, and an acetate of the metal $(\text{C}_2\text{H}_3\text{O})\text{OM}$ is produced. The term *acetyl* was formerly applied to the radical C_2H_3 .

ACHÆANS, one of the four races of ancient Greece, and a name often given by Homer to all Greeks. The A. inhabited parts of Thessaly, Argos, and Sparta, in the Peloponessus, whence they were expelled by the Dorians. Their government was democratic, and they preserved liberty until the time of Philip and Alexander, but were afterwards subject to the Macedonians, or oppressed by domestic tyrants. In mythology, their ancestor was Achæus, son of Xuthus and grandson of Hellen.

ACHÆMENES, ancestor and founder of the family of Achæmenidæ, from the time of Cyrus the royal house of Persia.

ACHA'IA, a small district in the n. of the Peloponessus, was divided into twelve little states; and was bounded e. by the Saronic gulf; n. and w. by the bay of Corinth; and s. by Arcadia and Elis. The land, rising gradually from the coast to the hills of the interior, was famed, in ancient times, for fertility in the produce of oil, wine and fruits. When the Romans divided the whole of Greece into Macedonia and A., the latter included all Greece excepting Thessaly. In the modern kingdom of Greece, A. forms, along with Elis, a *nome* or department, in the extreme n.w. of the Morea, and its chief t. is Patras (q.v.). Excepting the w. coast, the land is fertile, and produces corn.

wine and oil. — The ancient Achæans were, in a great measure, separated from the other people of Greece. Their twelve little towns of which Ægium was the chief, formed a confederacy, which was dissolved in the Macedonian times, but was renewed in 280 B. C., and subsequently extended itself, under the name of the *Achæan League*, throughout Greece. In 251 B. C. Aratus of Sicyon brought his city into the league and became the general of the confederacy. Its strength was afterward increased through the energy of Philopemen. Corinth had already become a member of the league and by the year 191 B. C. it included Athens, Sparta, Epidaurus, Megara, and many other cities of the Peloponnesus as well as of Northern Greece. The government of the league affords the best example in antiquity of the federal system, and has been compared to the government of the United States. Every city in the confederation had equal rights with the others, but in foreign affairs the federal government had complete control. There was a public council in which the affairs of the league were discussed and a record kept of its proceedings. The council had at first two presiding officers, but afterwards elected only one. The chief executive officer of the league was the strategos, who was commander-in-chief of the army; subordinate to him were the hipparchus or commander of the cavalry, and an under-strategos. There was a secretary of state and a sort of permanent council composed of ten men, who were said to have presided at the federal assemblies. For many years the league maintained its independence against all enemies. Something of the old power of Greece seemed to return, and there was a promise of permanent union, but it soon appeared that the league was bent on its own destruction. Instead of presenting a firm front against the common foes of Greece, its members were divided by continual discords. The Ætolian League was a formidable rival, but a still more dangerous enemy was Rome. In the first war between the Macedonians and the Romans 211–205 B. C., the league adhered to the Macedonians, but in the second Macedonian war it went over to the side of the Romans, and in the third remained neutral. The hostilities of Sparta combined with the intrigues of the Romans and the folly of the leaders of the league to bring about its destruction. In 146 B. C. the Achæans were defeated at Corinth by the Roman general Mummius. This defeat not only dissolved the league but destroyed the political independence of Greece. Southern Greece, under the name of Achaia became a Roman province. The historian Polybius, who was one of the noble Achæans taken to Rome as hostages in 166, has given an extended account of the league in his history of the period 220–146 B. C. See also Thirlwall's *History of Greece*, vol. 8. Schorn's *History of Greece from the Establishment of the Ætolian and Achæan Leagues*; Drumann's work on the *History of the Downfall of the Greek States*, and Hertzberg's *History of Greece under the Romans*.

ACHARD, FRANZ KARL, a meritorious naturalist and chemist, b. April 28, 1753, in Berlin, chiefly distinguished himself by his improvements in the process of preparing sugar from beet-root. In these labors he was supported by the king of Prussia. The results of his experiments were acknowledged as partly successful in 1799 and 1800; but were not carried into extensive application until the king gave to A. a farm in Lower Lusatia, where he founded a model manufactory of beet-root sugar. Here, after six years of experiments, conducted with the aid of Neubeck, a medical man, A. found out the true method of extracting beet-sugar; and in 1812, when the factory had become a very profitable investment, the king annexed to it a school for teaching the process of manufacture. A. was called to Berlin as director of the physical class in the academy of sciences, and died April 20, 1821. He wrote, among other similar essays, one on the *European Manufacture of Sugar from Beet* (Leip. 1809).

ACHARD, LOUIS AMÉDÉ EUGÈNE, 1814–75; b. Marseilles. He began life as a merchant; became a Parisian journalist and royalist writer; accompanied the duke of Montpensier to Spain. In 1847 he published *Belle Rose*, a successful novel; later, *Miss Tempête*, *Histoire d'un Homme*, *Le Clos-Pommier*, *L'Eau qui Dort*, *La Misère d'un Millionnaire*, *Madame de Soreus* and *Histoire de Mes Amis*. He was an officer of the legion of honor.

ACHATES, friend and companion of Æneas in his wanderings after the fall of Troy. His faithfulness to the Trojan chief originated the saying, "Fidus Achates," applied to any faithful friend, though not properly to an equal in position.

ACHATES, a river in southern Sicily, now the Dirillo. Pliny says agates were first found there, whence their name, from that of the river.

ACHEEN, or **ACHIN**. See **ATCHEEN**.

ACHELOUS, now called **ASPROPOTAMO** (i. e., White river, from the cream color of its waters) the largest river in Greece, rises in Mt. Pindus, flows through the land of the Dolopians, divides Ætolia from Acarnania, and falls into the Ionian sea. The extensive alluvial deposits at the mouth of this river have been observed from ancient times. It is said that the banks of the A. were anciently the haunt of lions.

ACHENBACH, ANDREAS, b. Cassel, 1815; a German landscape and marine painter. He studied under Schadow; was made a royal academician of Berlin, and hon. member in Philadelphia and other cities; is a knight of the legion of honor, and took a medal of the first class in Paris in 1855. Several of his paintings are in the U. S.

ACHENBACH, OSWALD, b. Dusseldorf, 1827, brother of Andreas, a painter of Swiss and Italian subjects.

ACHENIUM, **ACHENIUM**, or **AKENIUM**, a term now very frequently employed by botanists to designate a dry, hard, one-seeded, indehiscent fruit, in which the integuments of the seed are closely applied to it, but distinct from it. Such are what are popularly called the *seeds* of borage, and other plants of the same natural order. They were

termed nuts by Linnæus. Sometimes the achenia are aggregated upon a common receptacle, forming what is called an *staerio*, as in the ranunculus, in which they are placed upon a dry receptacle, or in the strawberry, in which the receptacle is fleshy. Sometimes the aggregated achenia are enclosed within the fleshy tube of the calyx, as in the rose. The fruit of the *compositæ* is also sometimes called an A.; but a different appellation (*cypsela*) has been given to it, because the tube of the calyx coheres with the fruit, the name A. being limited to *superior* fruits.

A'CHENWALL, GOTTFRIED, 1719-72, a chief promoter of the science of statistics. He studied at Jena and Leipsic; lectured at Marburg university on law, history and social science; and held a chair in the new university of Gottingen till his death. Though not the originator of the science of statistics, he was the first to formulate and define its purpose. Achenwall, it has been said, "defined politics as the theory of what a state ought to be; statistics the account of what it really is; and history the relation of how it became what it is." His wife, Sophie Elenore Walther, a rarely educated woman, wrote poems and essays.

ACH'ERON, the name given to several rivers by the ancients, always with reference to some peculiarity, such as black or bitter waters, or mephitic gases. The A. in Thesprotia, which flows through the lake Acherusia, and pours itself into the Ionian Sea; another river of the same name in Elis, now called Sacuto; and several streams in Egypt, were supposed to have some communication with the infernal world. According to Pausanias, Homer borrowed from the river in Thesprotia the name of his infernal A., which the later poets surrounded with many imaginary horrors. Other lakes besides that above mentioned bore the name of Acherusia, e.g., the lake near Hermione in Argolis.

ACHERON' TIA, or **DEATH'S-HEAD MOTH**, a genus of lepidopterous insects; belonging to the family *sphinxidae*. There is a species in Europe (*acherontia atropos*) having on the back of the thorax a singular representation of a human skull; hence the name. It is a beautiful insect, $4\frac{1}{2}$ in. long and 5 to $5\frac{1}{2}$ in. expanse of wings, and if disturbed or handled it makes a squeaking noise. The ignorant and superstitious believe it to be a forerunner of evil. It drives bees from their hives and eats their honey, taking no hurt from stings. It is seen most frequently mornings and evenings in autumn. Its larva is a fat caterpillar 5 in. long, greenish-yellow, and beautifully marked on the back with blue and white lines and black spots.

A-CHEVAL POSITION. When troops are arranged so that a river or highway passes through the center and forms a perpendicular to the front, they are said to be drawn up in A. P. Wellington's army at Waterloo was *à-cheval* on the road from Charleroi to Brussels. In cases where a river forms a perpendicular to the front, secure possession of a bridge is necessary; otherwise one half of the troops might be routed, while the remainder stood idly as spectators.

ACH ILL, or "Eagle" Isle, off the w. coast of Ireland, is reckoned within the county of Mayo. It is $15\frac{1}{2}$ m. long by $12\frac{1}{2}$ m. broad, and has a very irregular coast-line, though its general shape is almost that of a right-angled triangle. It has a wild and desolate appearance; most of the surface is boggy; of the 35,000 acres which the island contains, not half a thousand are cultivated. There are three villages in A., and a number of hovels or huts scattered over its barren moors, sometimes in small clusters, forming hamlets, but so wretched as hardly to be fit for beasts. A. rises towards the n. and w. coast, where the mountains attain an elevation of 2000 ft. One of them, composed, like the rest of the island, wholly of mica-slate, presents, towards the sea, a sheer precipice from its peak to its base, a height of 2208 feet. There is a mission-station in the island, which forms an exception to the general wretchedness of the houses. It possesses, amongst other agencies of civilization, a printing-press. The population amounted in 1871 to 6417; in 1881, to about 6700, but has since decreased.

ACHILLE' A, a genus of plants of the natural order *compositæ* (q.v.), having small flowers (heads of flowers) disposed in corymbs, and the receptacle covered with chaffy scales (small bractææ). The florets of the ray are female, and have a short, roundish tongue or lip; the florets of the disk are hermaphrodite, the tube of the corolla flatly compressed and two-winged; the involucre is imbricated.—The common **YARROW** or **MILFOIL** (*A. millefolium*) abounds in all parts of Europe and in some parts of North America—into which, however, it has perhaps been carried from Europe—growing in meadows, pastures, etc. It is about a foot in height: its leaves bipinnate, the pinnæ deeply divided, the segments narrow and crowded. It has white or rose-colored flowers. The leaves have a bitterish aromatic, somewhat austere taste, and little smell; the flowers have a strong aromatic smell, with an aromatic bitter taste, and contain an essential oil, a resin, bitter extractive, gum, several salts, and traces of sulphur. Both leaves and flowers are used in medicine as a powerful stimulant and tonic. The leaves were formerly much used for healing wounds, and are still so employed by the common people in the highlands of Scotland and in some parts of the continent. The expressed juice is a popular spring medicine in Germany. Yarrow is often sown along with grasses intended to form permanent pasture for sheep; and *A. moschata*, called **MUSK MILFOIL**, is cultivated as food for cattle in Switzerland. *A. moschata*, *A. atrata*, and *A. nana*—all natives of the

Alps—are very aromatic, and bear the name of **GENIPI** or **GENIPP**. The inhabitants of the Alps value them very highly, and use them for making what is called *Swiss tea*. They are very stimulating and tonic; as are also *A. setacea* and *A. nobilis*, both natives of Switzerland and other middle parts of Europe, and *A. ageratum*, a native of the south of Europe, used by the French as a vulnerary, and called *herbe au charpentier*.—**SNEEZE-WORT** (*A. ptarmica*) is a native of Britain and other parts of Europe, 1 to 3 ft. high, with lanceolate leaves, and much larger flowers than the common milfoil. It grows in meadows and damp places. The root, which is aromatic, is used as a substitute for *pellitory of Spain* (q.v.), and the whole plant is pungent and provokes a flow of saliva.

ACHIL'LES, the hero of Homer's *Iliad*, was the son of king Peleus and Thetis, a sea-goddess, belonging to a line descended from Jove. Of his life before the Trojan war, and of his death after the fall of Troy, the poets after Homer first profess to give accounts. We are told that he was dipped in the river Styx by his mother, and was thus made invulnerable, except in the heel, by which he was held during the process; hence "the heel of A." became a proverbial phrase to denote any vulnerable point in a man's character. It had been prophesied at his birth that his life would be short; and, therefore, when the seer Calchas announced that without A. Troy could not be taken, his mother, to keep him from the dangers of the expedition, concealed him at the court of king Lycomedes, among whose daughters the boy lived disguised as a girl. But Ulysses discovered him by a stratagem. He offered to the young ladies a number of articles, some of feminine attire and others of arms; and the young warrior was betrayed by his choice. A., in the Greek campaign against Troy, appeared with fifty vessels manned by his followers, the Myrmidons; but remained sullen and inactive during a great part of the contest. When the city of Lyrnessus was taken, he had seized and carried away the beautiful Briseis. A pestilence in the Greek camp being ascribed to the anger of Apollo, whose priest had been robbed of his daughter, Chryseis, by Agamemnon, Agamemnon was compelled by the army to send Chryseis back to her father. On this, he took away Briseis from A., which greatly offended the latter. With this incident the *Iliad* begins. Neither the splendid offers made by Agamemnon, nor the disasters of the Greeks, could afterwards move A. to take any part in the contest, until his friend Patroclus was slain by Hector. The hero then buckled on his armor, which had been made for him by Vulcan, and of which the shield is described at great length by Homer. The fortunes of the field were now suddenly changed in favor of the Greeks; and the vengeance of A. was not satiated until he had slain a great number of the Trojan heroes and lastly, Hector, whose body he fastened to his chariot, and dragged into the Grecian camp. He then buried his friend Patroclus with great funeral honors. King Priam, the father of Hector, came by night to the tent of A., and prayed that the body of his son might be given back to the Trojans. A. consented; and with the burial of Hector the *Iliad* closes. We are told that soon after the fall of Hector, A. made a contract of marriage with Polyxena, the daughter of the Trojan king, but was slain by her brother Paris, in the temple of Apollo, where the marriage should have been celebrated. According to other accounts, he was slain by Apollo, who assumed the likeness of Paris as a disguise. His ashes were placed in an urn, with those of his friend Patroclus, and were buried on the promontory of Sigeum, where, after the fall of Troy, the princess Polyxena, who had been made a prisoner, was offered as a propitiatory sacrifice.

ACHIL'LES TATIUS, an ancient writer, a native of Alexandria. There is great uncertainty as to the time in which he lived, some assigning him to the 2d or 3d century, others to a much later period, even to the 5th century. He wrote a novel entitled *The History of Leucippe and Clitophon*, which is graceful in style and interesting in subject matter, but is often disfigured by grossness in the narrative. It was extensively imitated by subsequent writers. An edition was published by Jacobs in Leipsic, 1821, and the Didot collection edited by Hirschig (Paris, 1856), contains its Greek text together with a Latin version in the *Erotici Scriptores*. There is an English translation by Smith (London, 1855).

ACHIL'LES' TENDON, *Tendo Achilles*, attaches the soleus and gastrocnemius muscles of the calf of the leg to the heel-bone. It is capable of resisting a force equal to a 1000 lbs. weight: and yet is frequently ruptured by the contraction of these muscles in sudden extension of the foot. The name was given with reference to the death of Achilles by a wound in the heel. Ancient surgeons regarded wounds of the A. T. as fatal.

ACHIME'NES, a genus of plants of the order *gesneraceæ* (q.v.), much cultivated for the beauty of their flowers. The species are numerous—natives of the warm parts of America.

ACHMET, or **AHMED**, the name of three sultans of Turkey, of whom Achmet III. was the most famous. It was this sovereign who sheltered Charles XII. after his defeat at Pultowa in 1709. He wrested the Morea from the Venetians in 1715. Having invaded Hungary, he was defeated by Prince Eugene at Peterwardein in 1716, and later near Belgrade. The soldiers drove him from the throne in 1730, and he died in prison in 1736.

ACHMIN. See **EKHMIM**.

ACHROMATISM, the property in virtue of which certain combinations of lenses, etc., refract a beam of light without producing colored fringes. Any arrangement of lenses or prisms which refract light without dispersion (q.v.; also **REFRACTION**) is achromatic. Newton, misled by imperfect experiments, concluded that dispersion could not be annulled without annulling refraction. Hall, in 1733, and later, Dollond (independently), found that certain media give large refraction with small dispersion, while others

give small refraction with large dispersion ; so that the dispersion produced by one medium can be made to annul that due to another, while its refraction is not entirely annulled. For example, by properly combining a convex lens of crown-glass with a concave one of flint-glass, a compound achromatic lens can be produced. The achromatism in the above arrangement, and in every other arrangement yet tried, is not absolutely perfect. The reason is that such media do not give exactly similar spectra (see SPECTRUM)—i.e., the ratio of the distances between any two pairs of rays is not quite the same for the different media. A combination of three lenses, or prisms, gives a better approximation to absolute achromatism than a combination of two. Blair, in 1791, constructed an achromatic telescope giving far better definition for high magnifying power than has since been obtained. He used a compound lens consisting of two glass lenses inclosing a liquid.

A CHULA (Portuguese), a dance similar to the *Fandango*.

ACIDIMETRY is the determination of the percentage of real acid contained in a sample of a hydrated acid, as sulphuric or nitric acid. In most cases, if we know that no foreign body is present, it is possible to determine the percentage by means of the specific gravity, as indicated by the areometer (q.v.). Usually, however, other substances, which alter the specific gravity, may be present, and recourse is then had to one of the following methods :

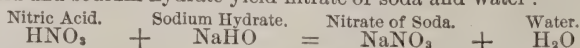
(I.) By volumetric analysis, in the manner described under alkalimeter (q.v.).

(II.) By the gravimetric process. This may be conducted in two ways, which will be best understood by an example of each. Sulphuric acid forms several insoluble salts, the sulphate of barium refusing to dissolve, not only in ordinary fluids, but even in strong acids. When chloride of barium is added to a liquid containing sulphuric acid, the sulphate of barium is precipitated, and after due precautions have been taken to insure its purity, it may be weighed and the amount of sulphuric acid calculated therefrom.

A more rapid method consists in adding to the sample some carbonate of soda, and noting the amount of carbonic acid disengaged. This is readily accomplished by performing the operation in a weighed flask, and determining the loss of weight after the carbonic acid gas has been liberated.

ACIDS. An acid is a chemical compound distinguished by the property of combining with bases in definite proportions to form salts (q.v.). The most striking characteristics of A. are a sour taste, and the property of reddening vegetable blues. They are also mostly oxidized bodies ; and at one time oxygen was thought to be essential to an acid, as the name *oxygen* (the acid-producer) indicates. Subsequent experience has extended the definition. There is an important class of undoubted A. that contain no oxygen ; and silix or flint, which, being insoluble, neither tastes sour nor reddens litmus-paper, is held to be an acid because it combines with bases and forms compounds like acknowledged A. The oxygen A., which are by far the most numerous class, are formed of elements (sulphur, nitrogen, chromium, etc.), with two or more equivalents of oxygen. The elements that form the strongest A. with oxygen are the non-metallic, and most of them have more than one stage of acid oxidation. Thus sulphur unites with oxygen to form two oxides, SO_2 and SO_3 , which, in combination with water, yield respectively sulphurous and sulphuric acid. Similarly, arsenic forms two oxides, As_2O_3 and As_2O_5 , corresponding to arsenious and arsenic A. The higher stage of oxidation forms the stronger and more stable acid. All metals, except arsenic, that form A. with oxygen, have also, at a lower stage of oxidation, one or more oxides. To these inorganic A. containing oxygen must be added the organic A., composed of carbon, hydrogen, and oxygen. Belonging to this extensive group are oxalic acid, $\text{H}_2\text{C}_2\text{O}_4$; acetic acid, $\text{HC}_2\text{H}_3\text{O}_2$; and formic acid, HCHO_2 . There are also A. found in animal fluids, or resulting from their decomposition, which contain nitrogen in addition to the three elements above named ; such is uric acid, $\text{H}_2\text{C}_4\text{H}_4\text{N}_4\text{O}_6$.

The *hydrogen* A. are formed of hydrogen and a radical, either simple or compound. The most important of these, and the type of its class, is hydrochloric or muriatic acid HCl ; others are hydriodic (HI) and hydrocyanic (HCN) acids. As all A., however, even oxygen A., possess acid properties—i.e., combine with bases—only when in combination with water, a new view of the constitution of A. now prevails, which makes hydrogen the real acidifying element in all A. Thus, instead of considering vitriol as a compound of sulphuric acid and water, $\text{SO}_3 + \text{H}_2\text{O}$, the hydrated acid is held to be the real sulphuric acid, and its rational formula to be H_2SO_4 . It thus becomes analogous to hydrochloric acid, HCl . This view has not only the advantage of bringing all A. into one class, but makes the theory of their combination with bases and of their capacity of saturation uniform and simple. Hence has arisen the most general definition of an acid—viz., that “A. are salts of hydrogen.” A more intelligible definition to ordinary readers is that which is adopted by Frankland, in which an acid is described “as a compound containing one or more atoms of hydrogen, which become displaced by a metal, when the latter is presented to the compound in the form of a hydrate.” Thus nitric acid and sodium hydrate yield nitrate of soda and water :



in which reaction the hydrogen of the nitric acid is replaced by the sodium of the

sodium hydrate (or soda); and as only *one* atom of hydrogen is replaced, nitric acid is said to be *monobasic*. When an acid admits of the displacement of two atoms of hydrogen, it is termed *dibasic*—as tartaric, oxalic, and sulphuric acid; and when three atoms can be replaced—as in common phosphoric acid, H_3PO_4 , in which H_3 may be replaced by K_3 or Ag_3 —the acid is termed *tribasic*. The more important A. are included in the following list:

A. containing no oxygen: Hydrochloric, HCl ; hydrobromic, HBr ; hydriodic, HI ; hydrocyanic, HCN ; hydrosulphuric or sulphuretted hydrogen, H_2S .

Inorganic A. containing oxygen: Boracic, H_2BO_3 ; carbonic, H_2CO_3 ; chromic, H_2CrO_4 ; hypophosphorous, H_3PO_2 ; nitric, HNO_3 ; phosphoric, H_3PO_4 ; phosphorous, H_3PO_3 ; sulphuric, H_2SO_4 ; sulphurous, H_2SO_3 .

Organic A.: Acetic, $HC_2H_3O_2$; benzoic, $HC_7H_5O_2$; citric, $H_3C_6H_5O_7$; gallic, $H_4C_7H_2O_5$; lactic, $HC_3H_5O_3$; salicylic, $HC_7H_5O_3$; tartaric, $H_2C_4H_4O_6$. *

The most characteristic inorganic A. (hydrochloric, nitric, phosphoric, sulphuric) are used in medicine in a very dilute condition as tonics and astringents, and to allay thirst in fevers. They corrode the teeth, however, and if long administered tend to disorder digestion; so they must be used with caution. Most of the group have special, some (as hydrocyanic, oxalic) extremely poisonous actions. The stronger A., when concentrated, are powerful caustics.

ACI REAL'E, a t. of Sicily, in the district of Catania. It lies at the foot of Mt. Etna, on the coast, where the small river Aci, flowing from Etna, enters the sea. The t. is built of lava, is defended by a fortress, and contains about 38,000 inhabitants, who are employed chiefly in the manufacture of linen and silk; it also carries on a not inconsiderable trade in flax and grain. Many of the edifices are very handsome. A. R. is famed for its mineral waters, and for the cave of Polyphemus and the grotto of Galatea.

ACIS, the son of Faunus and Symæthis, beloved by Galatea. Being jealous of him, Polyphemus the cyclops crushed him under a rock, and his blood gushing forth was changed into the river Acis, or Acinius, at the foot of Mt. Etna.

ACKERMAN, EVERETT GEORGE, D.D., author and educator, b. New York, 1850; was educated at the Buffalo Med. Coll., the Northwestern Univ., and the Garrett Biblical Institute. He entered the Genesee Conference of the M. E. Church in 1878; was president of the Blue Mountain University, 1879–1881, and Vice-Chancellor of the U. S. Grant University, 1891. He has published *Man a Revelation of God* and *Researches in Philosophy*.

ACLAND, JOHN DYKE, an English officer in the American revolution, commanding grenadiers at the battle of Stillwater, Oct. 7, 1777. He was shot in both legs by a storming party under Arnold. His wife was Harriet, daughter of the Earl of Ilchester, and showed great heroism in forcing her way to him after the fight. She wrote an account of the campaign. In 1778 Acland returned to England, where he resented remarks disparaging to Americans by Lieut. Lynch, who challenged him to a duel, at which A. contracted a cold of which he died.

ACLINIC LINE, an imaginary line around the earth between the tropics, where the needle has no inclination. It is called the magnetic equator, and is about 90° from the magnetic poles. The line is variable and irregular; in the western hemisphere it is s. and in the eastern n. of the geographical equator.

ACNĒ, (probably from Gr. *akme*, an efflorescence) is an important skin disease. It is placed by some dermatologists in the order *pustula*, and by others in the order *tubercula*, which includes solid, hard elevations of the skin, much larger than *papula*. The sebaceous follicles of the skin (q.v.) are the primary seat of the affection. Their natural secretion accumulates in their interior, and there is, at the same time, a tendency to inflammation of the follicle and surrounding tissue. It is by no means rare to find on the face and shoulders of young persons about or above the age of puberty a number of black spots, each of which is placed on a slightly-raised pale base. These black points are called *comedones*. Pressure at the base occasions the expulsion of a little, elongated, spiral, white mass, with a black point or anterior end, commonly but erroneously regarded as a worm.* Interspersed are other spots, with the base more raised and inflamed, which become more or less perfect pustules, each of which rests on a comparatively large red base. In some of the inflamed follicles coagulated lymph (to use the old phraseology) is thrown out, and a small hardened mass is the result. According as one or other of these appearances preponderates, we have different varieties of this disease. When the pustule is the most striking feature, the affection is called *acne simplex* or *vulgaris*; when the black points abound, it is *acne punctata*; and when there is decided induration, it is *acne indurata*.

As long as there is no inflammation, the treatment simply aims at favoring the escape of the contents of the sebaceous follicles, by rubbing the face and other affected parts with cold cream at bed-time, washing the next morning with soap and water, and gentle subsequent friction with a soft towel. When acute inflammation is present, and the pustules are very tender, there is no better application than tepid water, with or without a little gelatine in solution; and subsequently the ointment of the hypochlorite of sulphur has been found useful by Wilson and others. *Acne indurata*, which is the least

*In the midst of the white mass of sebaceous matter, a parasite, *acarus folliculorum* is, however, often found.

tractable of the three forms, is sometimes benefited by the application of fly-blisters. In all these cases the state of the digestive organs must be carefully attended to.

Acne rosacea is, according to some writers, a much more grave variety of acne; while others regard it as a special disease, to which they assign the name of *rosacea*, under which term it is described in this work.

ACCEMETEÆ, a class of Greek monks called watchers, who chanted service continuously day and night, dividing like sailors into three watches. They originated in the 5th c., near Constantinople, and established many monasteries. Some were denounced for favoring Nestorianism.

ACOLYTES, a name occurring first about the 3d c., and applied to functionaries who assisted the bishops and priests in the performance of religious rites, lighting the candles, presenting the wine and water at the communion, etc. They were considered as in holy orders, and ranked next to sub-deacons. These services have, since the 7th c., been performed by laymen and boys, who are improperly called A.; but in the Romish church, aspirants to the priesthood are still at one stage consecrated as A., receiving candles and cups as the symbols of the office. See **ORDERS**, **HOLY**.

ACOMA, a village in New Mexico, the Acuna of Spanish historians; 35° 24' n., 106° 10' w.; an old Indian t. built on a rock 400 feet high and reached only by spiral stairs cut in the stone. It has a church and missionary station.

ACONCA'GUA, a province of Central Chili; 6000 sq. m.; pop. '94, about 158,000. In the e. part are the Andes, with fertile valleys and many rivers running to the Pacific; there are copper, silver and gold mines. The w. part is artificially irrigated, and produces large crops of cereals and superior hemp. Rain is scarce, and natural vegetation light. The province is divided into four departments: Andes, Ligua, Petorca and San Felipe. Capital, San Felipe d'Aconcagua, at the foot of the Andes, 55 m. n.e. from Valparaiso.

ACONCA'GUA, the highest known mountain peak in the western hemisphere, n.e. of San Felipe, 32° 39' s., 70° w. The latest measure makes the height 6834 metres, or 22,422 ft. (4,245 m.), 997 ft. higher than Chimborazo. The cone is an angular, serrated mass, bare of vegetation, and without sign of volcanic action. It is a grand sight from Valparaiso.

ACONITE, (*Aconitum*), a genus of plants of the natural order *ranunculaceæ* (q.v.), having five petaloid sepals, of which the upper one is helmet-shaped, and two hammer-headed petals concealed within the helmet-shaped sepal. The fruit consists of 3 to 5 follicles. *A. napellus*, the common WOLF'S-BANE or MONK'S-HOOD, often cultivated in flower-gardens for the sake of its erect racemes of blue flowers, is a somewhat doubtful native of England, but common in some parts of Europe. The roots are fusiform and clustered. The root and whole plant are very poisonous, containing an alkaloid called *aconita* or *aconitine*, one of the most virulent of all known poisons; but an extract of the leaves is a valuable medicine, administered in small doses for nervous and other diseases. An A., sometimes called *A. stoerckianum*, but generally regarded as a variety of *A. cammarum* (also known as *A. paniculatum*), was brought into great repute on the continent during the last c. by Dr. Stoerck, an Austrian imperial physician, and is still much cultivated for medicinal use. The same properties seem, in greater or less degree, to belong to a number, if not to all, of the species of this genus, and they contain the same alkaloid. The virulent *bikh* poison of India, equally fatal in its effects whether introduced into wounds or taken into the stomach, is prepared from the roots of several species. The *A. ferox* of Nepal, from which much of it is obtained, has been identified by Drs. Hooker and Thompson with *A. napellus*. Two other Himalayan species, *A. palmatum* and *A. luridum*, are equally employed in its preparation. *A. album*, or white-flowered monk's-hood, a native of the Levant, and *A. lycoctonum*, yellow-flowered monk's-hood, or wolf's-bane, a native of the Alps, are not unfrequently seen in flower-gardens. *A. uncinatum* and *A. reclinatum* are found in the eastern United States. The former has blue flowers, the latter, white. The English winter A. is a species of *hellebore* (q.v.). For blossom of *A. napellus*, see illus., **FLOWERS**, vol. VI.

ACORN-SHELL. See **BALANUS**.

ACOR'US, a genus of plants of the natural order *aroidæ* (see **ARUM**), or, according to other botanists, of the natural order *orontiaceæ*, which is regarded as a connecting-link between *aroidæ* and *juncææ*. The plants of this genus have a leaf-like scape, which bears upon its side a dense, cylindrical, greenish spike of flowers, with 6-partite herbaceous perianth and six stamens in each flower. To this genus belongs the SWEET FLAG (*A. calamus*), which was long ago brought from Asia, and in the 15th c. was planted in the gardens of princes and rich men, but has now become naturalized in England, Germany, etc., growing in marshes and ditches. Its root (rhizome) is perennial, divided into long joints about the thickness of the thumb, has a bitterish acrid taste, and is very aromatic. It is a powerful medicine of transient tonic effect, occasionally used, especially in cases of weak digestion. In many places on the continent it is to be found in every confectioner's, cut into slices, and prepared with sugar. It is also used to correct the empyreumatic

odor of spirits, and to give them a peculiar flavor. It is called *calamus root*. In Britain it is chiefly employed by perfumers in the manufacture of hair-powder.—The other species of *A.* are likewise aromatic, and are applied to the same uses. *A. gramineus* is cultivated in China.

ACOSTA, GABRIEL, a Portuguese nobleman, descended from a Jewish family; b. at Oporto, in 1587. After being educated in the doctrines of the Roman Catholic church, he became skeptical, and leaving Portugal, went to Amsterdam, where he adopted the Jewish faith and changed his name, which had been Uriel; but he soon wrote against the Pentateuch, disputed the doctrine of the soul's immortality, and became involved in controversy with his rabbinical teachers. On account of his work, entitled *Examen de Tradicoens Phariseus conferidas con à ley Escripta* (Examination of Pharisaic Traditions compared with the Scriptures), 1624, he was charged with atheism by the Jews before a Christian magistracy. Having lost his property, and being sentenced to a seven years' excommunication, he sought reconciliation with the synagogue, and submitted to very ignominious chastisements, which were repeatedly inflicted as often as his religious doubts arose; until, in a state of insanity, he ended his career by suicide about 1640, if this last story is credible. His autobiography was published in Latin and German (Leip. 1847).

ACOSTA, JOAQUIN, a military engineer and historian; born in Guaduas, Columbia, in 1799; in 1834, with Cespedes the botanist, undertook a scientific expedition from the valley of the Socorro to that of the Magdalena, and seven years later visited the country from Antiocha to Anserma; went to Spain, where he lived several years. His chief work is *The Discovery and Colonization of New Granada*. He also made a map of that republic, and furnished essays to the Paris geographical society. He died in 1852.

ACOSTA, JOSE D'; b. 1539, d. 1600; was educated a Jesuit and made professor of theology; was sent as missionary to South America, and on return was superior of Valladolid and rector of the university of Salamanca, where he died. His work, *The Natural History of the Indies*, is high authority, and known in many languages.

ACOMETER or **ACOUSMETER**, an instrument used to determine the degree of hearing; consisting of a steel cylinder attached to a vulcanite column. The vibrations of the cylinder, when placed near the external ear, and struck with a small hammer, are better tests than a watch or human voice.

ACOTYLEDONOUS PLANTS (*acotyledones* of Jussieu), one of the great primary classes into which the vegetable kingdom is divided, according to the structure of the seed and whole development therewith connected. The class of *acotyledones* contains those plants which, in the Linnæan system, form the class known as *Cryptogamia*. It consists partly of *acrogenous plants* (q.v.), as ferns and mosses, and partly of *thallogenous plants* (q.v.), as lichens, fungi, and algæ. It thus includes the vegetable tribes of lowest organization, whose embryo exhibits no distinct seed-lobes (cotyledons), but is a mere cell or *spore*, with granular matter in its interior, and germinates indifferently from any point of its surface. See **CRYPTOGAMOUS PLANTS**.

ACOUSTICS (Gr. *akouo*, I hear) is the science of sound. This part of physics is often treated in connection with the atmosphere—an arrangement that seems inappropriate; for the atmosphere is only the most common conductor of sound; and every substance, whether solid or fluid, is capable, as well as air, of sounding itself, or of conveying the sound of other bodies. *A.* is rather a part of the science of motion. All motion is either rectilineal, circular, or vibratory; and when a vibratory motion is quick enough to affect the sense of hearing—for which at least thirty vibrations in a second are required—it constitutes a sound. A definable, uniform sound is a note or tone, and the rapidity of the vibrations is its pitch; a confused indeterminate sound is a noise. The chief subjects treated of in *A.* are: 1. Musical sounds, or notes (q.v.). Here the question is concerning the absolute and relative velocities of the vibrations, and those modifications, called temperament, to which their original proportions are subjected for the practical purposes of music. 2. The origin of sound (q.v.), and the laws which guide the vibrations of sounding bodies, and which give rise to different phenomena in different substances. In all sounding bodies, it is elasticity that is to be looked upon as the moving power. The elasticity of a sounding body may arise from stretching, as in the strings of a violin or the head of a drum; or from its own stiffness, as in rods, bells, etc. 3. The propagation of sound, as well through the air and other gases as through solids and liquids; and the reflection of sounds or echoes. All elastic bodies conduct sound, many much more powerfully than air. In water the conducting power is four times stronger than it is in air; in tin, seven times; in silver, nine times; in iron, ten times; in glass, seventeen times. 4. Perception of sound, or the structure and functions of the ear (q.v.).

The ancients had made attempts to cultivate *A.* Pythagoras and Aristotle were aware of the way that sound is propagated through the air, but as a science independent of its application to music it belongs almost entirely to modern times. Bacon and Galileo laid the foundation of this new mathematical science; Newton showed by calculation how the propagation of sound depends upon the elasticity of the atmosphere or other conducting medium. He observed that a sounding body acts by condensing the portions of air that lie next it, and in the direction of the impulse. These condensed portions then spring back by their elasticity, and at the same time impel forwards the portions lying next them.

Each separate portion of air is thus driven forwards and backwards; and thus all round the sounding body there is an alternate condensation and rarefaction of air, constituting, as it were, waves of sound. In determining the velocity of sound, Newton, Lagrange and Euler erred in their calculations; the best researches on this subject are those of Laplace. Chladni first raised A. to an independent science. In recent times, comparatively little has been done in this branch of physics. Savart has determined more exactly the number of vibrations in a second necessary to produce an audible sound; and Cagniard de Latour invented the siren, and discovered many of the conditions under which both solids and fluids sound. The sounding of heated metals, when laid on cold metallic supports, has occasioned much discussion. See *Edinb. Phil. Journal*. Faraday and Marx have examined the figures of sound; Wheatstone, the phenomena of sympathetic sounds; and Mr. Bell, the formation of vowel-sounds by the human voice.

While the principles of A. are well known in theory, they are seldom carried out to a satisfactory result in practice. We allude more particularly to the many instances in which costly assembly halls and churches are defective as regards public speaking; it being seemingly a mere chance that new edifices of this kind exhibit proper acoustic qualities. In some cases, the sounds uttered cause echoes and reverberations, perplexing alike to a speaker and his auditory, and in others the sounds are dispersed at a high elevation and are lost. This subject urgently demands consideration in connection with architecture. As a general rule, the ceilings of halls should be at a moderate elevation; the lowering of a ceiling and the removal of chandeliers have been known to improve the speaking and hearing properties; and the hanging up of flags and draperies has, in a variety of instances, had a similarly good effect. The whispering gallery of St. Paul's, London, offers an interesting example of one of the phenomena in acoustics. The velocity of sound has been accurately determined by ascertaining the exact time intervening between the flash and report of a gun, as observed at a given distance, and dividing the distance by the time. After many experiments in various countries, Van der Kolk assigned 1091 ft. 8 in. per second, with a probable error of 3.7 ft. as the velocity of sound in dry air at 32° Fahr. More recent experiments by the astronomer royal at the cape of Good Hope, give 1096 ft. To this velocity may be added 1.11 ft. for each degree Fahr. But air is not a perfect gas, and the variations of elastic force caused by a wave of sound passing through it are not uniform; so these measures, though approximately, may not be absolutely, correct. Furthermore, the rapidity of transmission depends upon the loudness of the sound; and capt. Parry found, in the polar regions, that the discharge of a cannon at a distance of 2½ m. was heard perceptibly sooner than the word ordering to fire, which, of course, preceded the discharge. There is also a gradual falling off in the speed of sound; and Regnault determined that a sound decreased in speed by 2.2 ft. per second in passing from a distance of 4000 ft. to one of 7500 ft. He also found that the velocity depended upon the pitch, the lower notes traveling faster than the higher ones; thus, the fundamental note of a trumpet travels faster than its harmonies. Sound travels faster in liquids than in air, and faster in solids than in liquids. In the river Seine, at 59° Fahr. the speed was 4714 ft. per second. Through iron, sound travels ten and a half times faster than through air. Experiments on telegraph wire produce almost identical results. Different metals transmit sound in widely different degrees. Wertheim assigned 16,832 for iron and 4030 for lead, at a temperature of 68° Fahr. Except in a few cases, the loudness of a sound is less as the distance increases between the source of the sound and the ear. In an unlimited and uniform medium, the loudness of the sound proceeding from a very small sounding body varies inversely as the square of the distance. But to verify this fact it would be necessary to make a test at a considerable elevation above the earth's surface, the ear and source of sound being separated by air of constant density. As the density of the air diminishes, it would be found that the loudness of a sound at a given distance would decrease. The decay of sound due to this cause is observable in the rarefied air of high mountain regions. De Saussure found that the report of a pistol at a great elevation appeared no louder than would a small cracker at a lower level. But it must be stated that when air-strata of different densities are interposed between the sound and the ear placed at a given distance, the intensity depends only on the density of the air at the source itself; whence it follows that sounds proceeding from the surface of the earth may be heard at equal distances as distinctly by a person in a floating balloon as by one situated on the surface itself; whereas any noise originating in the balloon would be heard at the surface as faintly as if the ear were placed in the rarefied air on a level with the balloon. This was exemplified by Glashier, the aeronaut, who, at an elevation of 20,000 ft. heard with great distinctness the whistle of a locomotive passing beneath him. The prolonged roll of thunder, with its manifold varieties, is partly to be ascribed to the reflection of the sound by mountains, clouds, etc., but is mainly due to the comparatively low rate of transmission through air. The explanation will be more easily understood by noting the case of a volley fired by a long line of troops. A person at a given point in the line would hear the sound of the nearest musket first, and of the others in the order of distance, and the effect would be a prolonged roll, concluded by the musket most remote from the hearer though all were

fired at the same instant; and the roll would gradually decrease in loudness. If he stood exactly opposite the centre of the line, the reports from either end would reach him simultaneously and the effect would be more nearly a loud crash. If the soldiers formed a circle, the listener in the centre would hear a single explosion, since the report of every gun would reach his ear at the same instant, and the whole explosion would be equal to that of the sum of all the separate discharges. By varying the form of arranging the troops, corresponding variations in the sound would be produced. Keep in view, then, the fact that flashes of lightning may be regarded as representing lines of troops, at the points and along the ranks of which explosions are generated at the same instant of time; then consider the variety of distance and position relative to the electric discharge of the listener, and we find no difficulty in accounting for the rolling peals of thunder. In a mountainous region this rolling is greatly augmented by reverberations or echoes from the steep declivities.

ACQUAVIVA, a t. of s. Italy, in the province of Bari, 16 m. s. of the t. of Bari, in a healthy situation at the foot of the Apennines. It is surrounded with walls and ditches, has a handsome parish church, several convents, hospitals, etc. Pop. about 8000.

ACQUAVIVA, CLAUDIO D', a general of the Jesuits; b. in Italy; he regulated the studies of the order, and prohibited the discussion of tyrannicide. His *Ratio Studiorum* is still considered authority. Born, 1552; d. 1615.

ACQUI (Lat. *Aquæ Statiellæ*), a walled t. of n. Italy, on the left bank of the Bormida, 18 m. from Alessandria. It derives its name from its hot sulphur springs, which were known to the Romans, and which are much frequented by invalids. The t. is of great antiquity, and contains many remarkable ecclesiastical buildings. Pop. about 11,000.

ACRE. The word is identical with Lat. *ager*, Gr. *agros*, "a field;" the Ger. *acker* means both "a field" and a "measure of land." Most nations have some measure nearly corresponding; originally, perhaps, the quantity which one plow could plow in a day; uniformity, therefore, is not to be looked for.

The English statute A. consists of 4840 sq. yards. The chain with which land is measured is 22 yards long, and a sq. chain will contain 22×22 , or 484 yards; so that 10 sq. chains make an acre. The acre is divided into 4 roods, a rood into 40 perches, and a perch contains $30\frac{1}{2}$ sq. yards. The Scotch A. is larger than the English, and the Irish than the Scotch. 121 Ir. ac. = 196 Eng. nearly; 48 Sc. ac. = 61 Eng. The following table shows the values of the more important corresponding measures compared with the English A. The German morgen below are becoming obsolete, as the German empire has adopted the French metrical system.

English acre.....	1.00	Prussia { little morgen.....	0.63
Scotch "	1.27	{ great morgen.....	1.40
Irish "	1.62	Russia, deciatina.....	2.70
Austria, joch.....	1.42	Sardinia, giornate.....	0.93
Baden, morgen or acre.....	0.89	Saxony, morgen.....	1.36
Belgium, hectare (French).....	2.47	Spain, fanegada.....	1.06
Denmark, toende.....	5.5	Sweden, tunneland.....	1.13
France { hectare (= 100 ares).....	2.47	Switzerland, faux.....	1.62
{ arpent (common).....	0.99	" Geneva, arpent.....	1.27
Hamburg, morgen.....	2.38	Tuscany, saccata.....	1.22
Hanover, "	0.64	United States, English acre.....	1.00
Holland, "	2.10	Württemberg, morgen	2.40
Naples, moggia.....	0.83	Roman jugerum (ancient).....	0.66
Poland, morgen.....	1.38	Greek plethron (ancient).....	0.23
Portugal, geira.....	1.43		

ACRE, ST. JEAN D', or ACCA, the biblical *Accho*, known as *Ptolemais* in the middle ages, is a sea-port on the coast of Syria, not far from the base of Mt. Carmel, and contains about 7000 inhabitants. The harbor is partly choked with sand, yet is one of the best on this coast. A. has often been the arena of warfare, and has suffered many changes of fortune. In 1110, it was taken by crusaders; in 1187, by the sultan Saladin; in 1191 was recaptured by the crusaders and afterwards became the seat of a bishop and of the Order of St. John; next, it fell into the hands of the Egyptians; and in 1517 was captured by the Turks; in 1799, it was besieged by the French for sixty-one days, but was successfully defended by the garrison, aided by a body of English sailors and marines under Sydney Smith. In 1832, it was stormed by Ibrahim Pasha, son of the viceroy of Egypt, and continued in his possession till it was bombarded and taken, in 1840, by a combined English, Austrian, and Turkish fleet. See EGYPT.

ACRELIUS, ISRAEL, 1714-1800, b. in Sweden; studied at Upsal; was ordained in 1743; appointed provost of the Swedish congregation on the Delaware; came to America and was pastor of the church at Christiana. After several years he returned to Sweden, and received a pension and a church living. He wrote a description of the Swedish settlements in America, translated into English in 1874.

ACRI, a t. of s. Italy, in the province of Cosenza, 13 m. n. e. of the t. of Cosenza, in a beautiful and healthy situation, with a fertile country around. Pop. 12,000.

ACRITOCROMACY (Gr. *akritos* and *chromatia*, which, when associated, imply "inability to discriminate between colors") is a term which seems likely to supersede *color blindness*, *daltonism*, *achromotopia*, etc.

ACROBAT, a word derived from the Greek, and nearly synonymous with rope-dancer. It literally signifies one who walks on tip-toe (*akron*, an extremity, and *baino*, I go); and is employed to designate those who perform difficult feats, vaulting, sliding, tumbling, and dancing on a slack or tight rope, stretched either horizontally or obliquely. These feats require great skill, suppleness, and steadiness. For a long time, acrobats were contented to divert and astonish only children or the most ignorant of the populace; but the extraordinary skill of some recent performers has given this perilous art a great celebrity. Within the nineteenth century, Farioso, Madame Saqui, and Signor Diavolo have excited admiration by their marvellous agility; Blondin was even more widely known. The acrobats of antiquity appear to have closely resembled those of our own day.

ACROCERAUNIA, in ancient geography a promontory in the n.w. of Epirus, terminating in Montes Ceraunii, now cape Linqueeta; lat. $40^{\circ} 25' \text{ n.}$ The frequent striking of lightning at or near the mountain gave the name, which is equivalent to "thunderbolt peak."

ACRO-CORINTHUS, a steep hill of 2000 ft., near Corinth; the site of the Acropolis or citadel, and commanding a beautiful view.

ACROGENOUS PLANTS (Gr., growing at the summit) are plants in which the structure of the stem is *acrogenous*—that is, in which the vascular bundles are developed simultaneously, and not in succession, the stem increasing by the coherence of the bases of the leaves and by elongation at the summit. In a transverse section of stem a circle of vascular tissue is found near the circumference, and the centre is composed of cellular tissue, some portion of which frequently disappears, so that the stem, although solid when young, becomes hollow in a more advanced stage of its growth. Tree-ferns afford the finest specimens of the acrogenous stem. All A. P. have *stomata*, or breathing-pores, on the surface. In general, they have a distinct stem and leaves arranged with most perfect symmetry. Some plants, in which the distinct stem is absent, are ranked with



Section of Acrogenous stem.



Tree Fern.

A. P., because the *thallus* has the texture of leaves, and exhibits a higher organization than in *thallogamous plants* (q.v.). A. P. are all *acotyledonous* (q. v.); and under this designation are included *ferns*, *equisetaceae*, *lycopodiaceae*, *marsileaceae*, *mosses*, and *hepaticeae*.

ACROLEIN ($\text{C}_2\text{H}_3\text{COH}$) is a colorless, limpid, strongly refracting liquid, lighter than water, having its boiling-point at about 126° F. It constitutes the acrid principle produced by the destructive distillation of fatty bodies, and is in part due to the decomposition of glycerine. It is best prepared by distilling a mixture of glycerine and anhydrous phosphoric acid, the object of the latter being to effect the removal of the element of four atoms of water from the glycerine ($\text{C}_3\text{H}_5\text{O}_3$), which contains the elements of acrolein ($\text{C}_2\text{H}_3\text{COH}$) + those of 2 molecules of water ($2\text{H}_2\text{O}$). In its state of vapor it is extremely irritating to the eyes, nostrils, and respiratory organs—a property to which it owes its name. The pungent smell given off by the smouldering wick of a candle just blown out is due to the presence of acrolein. When mixed with a solution of potash or soda, the irritating odor disappears, and is replaced by one of cinnamon; while a brown resinous substance is formed; and certain oxidizing agents, as oxide of silver, convert it into *acrylic acid* ($\text{C}_2\text{H}_3\text{COOH}$).

ACROLITHS (Gr. *acron*, extremity; *lithos*, a stone), the name given to the oldest works of Greek plastic art, in which wood-carving is seen in transition into marble statuary. The trunk of the figure is still, in the old style, of wood, covered with the usual temple vestments; but the extremities—head, arms, feet—which are meant to appear naked from below the drapery, are of stone.

ACRON, a physician of Sicily in the 5th c. B.C., who is said to have originated the practice of stopping pestilence by purifying the air with large fires, though this is doubtful. He wrote several works on medical subjects, but none of them are extant.

ACROPOLIS, "the highest point of the city." Many of the important cities of Greece and Asia Minor were protected by strongholds, so named. The A. occupied a lofty position, commanding the city and its environs; inaccessible on all sides except one, which had, for the most part, artificial defenses. It contained some of the most important public buildings, especially temples, besides affording a last refuge in case of a hostile attack. The A., like the castle of the middle ages, had formed the center or nucleus

around which the town gradually grew. Among the most celebrated of the ancient **A.s** was that of Argos, whose name, Larissa, indicates its Pelasgic origin; that of Messenia, which bore the name of Ithome; that of Thebes, called Cadmea; that of Corinth, known as Acro-Corinthus; but especially that of Athens, which was styled pre-eminently the **A.** See **ATHENS.**

ACROS TIC is a Greek term for a number of verses the first letters of which follow some predetermined order, usually forming a word—most commonly a name—or a phrase or sentence. Sometimes the final letters spell words as well as the initial, and the peculiarity will even run down the middle of the poem like a seam. Sir John Davies composed twenty six *Hymns to Astrea* (Queen Elizabeth), in every one of which the initial letters of the lines form the words **ELISABETHA REGINA.** The following is one of the twenty-six:

E v'ry night from ev'n to morn,
L ove's chorister amid the thorn
I s now so sweet a singer;
S o sweet, as for her song I scorn
A pollo's voice and finger.

B ut, nightingale, sith you delight
E ver to watch the starry night,
T ell all the stars of heaven,
H eaven never had a star so bright
A s now to earth is given.

R oyal Astrea makes our day
E ternal with her beams, nor may
G ross darkness overcome her;
I now perceive why some do write
N o country hath so short a night
A s England hath in summer.

In the **A.** poetry of the Hebrews, the initial letters of the lines or of the stanzas were made to run over the letters of the alphabet in their order. Twelve of the psalms of the Old Testament are written on this plan. The 119th Psalm is the most remarkable. It is composed of twenty-two divisions or stanzas (corresponding to the twenty-two letters of the Hebrew alphabet), each stanza consisting of eight couplets; and the first line of each couplet in the first stanza begins, in the original Hebrew, with the letter *aleph*, in the second stanza with *beth*, etc. The divisions of the psalm are named each after the letter that begins the couplets, and these names have been retained in the English translation. With a view to aid the memory, it was customary at one time to compose verses on sacred subjects after the fashion of those Hebrew acrostics, the successive verses or lines beginning with the letters of the alphabet in their order. Such pieces were called *Abecedarian Hymns*. See *Hook's Church Dictionary*.

ACROTE RION (Gr., the summit or extremity), a term in arch. for a statue or other ornament placed on the apex or at one of the lower angles of a pediment. Some understand by **A.** the pedestal on which such ornament stands.

ACT, in the drama, is a distinct part of the general plot or action, and its conclusion is usually marked by a fall of the curtain. An act should be, in a certain sense, complete in itself, and at the same time should form a necessary part of the whole drama. As every dramatic plot naturally divides itself into three parts—the exposition, the development, and the conclusion or catastrophe—a division into three acts would seem most natural; but in practice it has been found inconvenient to inclose extended plots in such limits, and since the time of the ancient Greek tragedy, *five* acts have generally been considered necessary. In the first act, the general nature of the drama is indicated, the characters are introduced, and the action commences. The plot should rise in interest in the second, and reach its climax in the third act. In the fourth act, the conclusion or catastrophe should be prepared, but should by no means be anticipated so as to weaken the effect of the *dénouement*, which must occupy the fifth act. This is a rather difficult task; and, accordingly, many dramas fail in the fourth act.

ACT, in English universities, is an exercise preparatory to receiving a degree. The student who “keeps the act,” and who is called the “respondent,” reads a Latin thesis on some proposition which he has announced that he is to maintain. Three other students, who have been named by the proctor as “opponents,” then try, one after another, to refute his arguments syllogistically in Latin. The practice of keeping acts is still adhered to, as a form at least, at Cambridge.

ACT, in law, has various meanings. In its more general acceptance it is used to denote the solemn accomplishment of some distinctive proceeding, as when a person in the U. S., when executing a legal instrument, declares it to be his *act and deed*. Formerly, in Scotland, the word **A.** was frequently applied to the procedure in a litigated cause; and to this day the technical term to signify a plaintiff in Scotch pleading (which differs from that of England) is *actor*. By an **A.** is sometimes meant an act or proceeding, or rather the record of an act or proceeding, of a public nature—and in this sense it is used when we speak of an *A. of Parliament* (q.v.). This use of the word appears to be derived from the Romans, who employed *acta* to signify specially public official transactions, and oftener perhaps the records of such transactions. The *Acta Diurna* was a kind of

official Roman gazette, giving an account of the public transactions and events of the day. The Germans use *acten*, and the French *actes*, to signify official or legal documents, or papers generally.

But the word *A.* has at the present day several precise legal applications, the principal of which we now proceed to mention and explain :

ACT OF GOD is a legal expression, and signifies any natural or accidental occurrence, not caused by human negligence or intervention ; such as the consequences arising from storms, lightning, tempests, etc., and which are deemed fatalities and losses such as no party under any circumstances (independently of special contract) is bound to make good to another. It has been ruled in England that the loss must be immediate, and the necessary consequence of the accident.

ACT OF INDEMNITY is an annual act of parliament passed for omissions in taking the oaths and assurances required by law of persons admitted to any public office or employment.

ACTA (**DIURNA**, **POPULI**, **URBANA**, or **PUBLICA**), a sort of daily newspaper published at Rome, chronicling the important events of the day, giving summaries of the principal legal and political orations, the decisions of the courts, news from the army and the latest gossip of the town. They seem also to have contained accounts of the transactions of the assemblies of the people, also of births, deaths, marriages, and divorces, accidents, prodigies, and the like, all of which were preserved as sources of future history. When Antony offered Cæsar a crown on the feast of the Lupercalia, Cæsar ordered it to be noted in the *Acta Diurna*. The *Acta* are frequently said to have been introduced by Julius Cæsar, but others believe them to have existed long before Cæsar's time, and to have supplanted the *Annales*, which fell into disuse about the year 131 B. c. The Latin scholar Hübner has advanced strong arguments in support of the former view, although it was the practice before Cæsar's time for scribes to compile a manuscript chronicle of public events in the city of Rome, which was often forwarded with private letters to absent friends. The *Annales* took note only of the most important events, whereas matters of far less importance were included in the *Acta Diurna*. The material for the *Acta* was gathered by reporters called *actuarii*, and the *Acta* were exposed in public places to be read or copied by any who chose to do so. After a reasonable period of time they were taken down and preserved with other public documents. Persons in Rome were accustomed to keep their friends who were sojourning out of town informed of the progress of events and of the news generally, as gathered from the *Acta Diurna*. A passage in Petronius (cap. 53) gives an imitation of the *Acta*. From this it would appear that the style was very simple, and that only the bare facts were stated.

ACTA MARTYRUM. This name was given by the ancient church to the records of the lives and sufferings of the Martyrs which were kept for the edification of the faithful. The oldest extant refer to the death of St. Ignatius of Antioch, who died about the year 107. St. Augustine speaks of these records as being read to the people on their festival days. Eusebius, the church historian, collected the *Acta Martyrum* in his two works, *De Martyribus Palestine*, and *Synagoge Martyrum*.

ACTÆA, a genus of plants of the natural order *ranunculaceæ* (q. v.), the type of the sub-order *actææ*, distinguished by the colored imbricated calix and indehiscent succulent fruit. The genus *actæa* has four deciduous sepals, four petals, and a single baccate carpel.—*A. spicata*, the baneberry or herb christopher, is a native of the n. of Europe, found in bushy places in some parts of England. It is a perennial herbaceous plant, about 1 to 2 ft. high, with triternate leaves, and the leaflets deeply cut and serrated, the flowers in racemes, the berries black and poisonous. The root is anti-spasmodic, expectorant, and astringent, and is sometimes useful in catarrh. *Botrophis actæoides* (*actæa racemosa* of Linnaeus) is a native of the U. S., whose roots are said to possess similar qualities, and are also reputed as a remedy for the bite of the rattlesnake.

ACTÆON, a mythical personage, a grandson of Cadmus. He was trained as a hunter by Chiron. Having once surprised Diana while bathing in a fountain, he was changed by the offended goddess into a stag, and his own dogs, not knowing him, tore him in pieces. According to Euripides, Diana was jealous because Actæon had boasted that he excelled her in hunting.

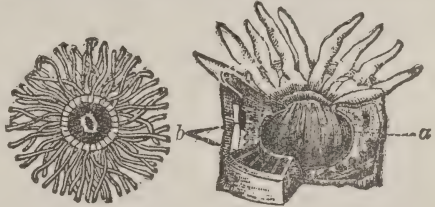
ACTA ERUDITORUM, the first literary serial in Germany ; was begun 1682 by Otto Mencke, professor in Leipsic university, published monthly in Latin, and kept in the founder's family until 1754, when change of management and neglect reduced its circulation and reputation. The last volume, completing the record of science to the close of 1776, appeared in 1782. The whole set is in 117 vols, 4to. There have been many imitations in various countries.

ACTA SANCTORUM or **MARTYRUM**, acts of saints or martyrs, the collective title given to several old writings, respecting saints and martyrs, in the Greek and Roman Catholic churches, but now applied especially to one extensive collection begun by the Jesuits in the 17th c., and intended to serve as a better arrangement of the materials found in ancient works. This great undertaking, which was commenced by the Jesuit Heribert Rosweyd of Antwerp, has considerable importance, not only in a religious and ecclesiastical point

of view, but also with regard to history and archæology. After Roswey's death, in 1629, J. Bolland was commissioned by the order of Jesuits to continue the work; and with the assistance of G. Henschen he prepared two volumes, which appeared in 1643. After the death of this editor (1665), the work was carried on by a society of learned Jesuits, who were styled "Bollandists," until 1794, when its further progress was prevented through the invasion of Holland by the French. In recent times, the undertaking has been resumed; and in 1846 the fifty-fourth volume was published at Brussels. Several additional volumes have appeared since. The lives are arranged in the order of the calendar. A new edition of the first 54 vols. appeared in 1863-69. The sixty-fifth volume appeared in 1892. For notices of other and similar collections, see SAINTS, MARTYR, and MARTYROLOGY.

ACTIN GAMES. See ACTIUM.

ACTINIA, a genus of marine animals, belonging to the sub-kingdom *calenterata* (see SUB KINGDOMS, ANIMAL), and to the class *actinozoa*, of which latter group the genus is thoroughly typical. The animals included in this genus are familiarly known as "sea-anemones." They are found attached by their bases to rocks and stones, and present the appearance of cylindrical fleshy bodies, possessing a mouth surrounded by numerous tentacles in the free extremity. These tentacles in the genus *A.* are of simple, tubular conformation. They are perforated at their tips, and also possess sucker-like disks. The mouth leads into a stomach-sac, which (as in all cœlenterate animals) communicates freely below with the general body-cavity, and thus comes to resemble a pocket with the bottom cut out. The stomach-sac is kept in its place by a series of vertical radiating plates, named *lamellæ* or *mesenteries*, to the faces of which the reproductive organs are attached. The actinidæ are capable of slow movements by expanding and contracting the muscular bases of their bodies. They may be cut and divided in various ways, with the result of producing new individuals by *artificial fission*. Some species may attain a great age.



Actinia seen from above. SECTION OF ACTINIA:

a, cavity of stomach; b, surrounding chambers.

ACTINISM, the property of the sun's rays which produces chemical changes. See SPECTRUM.

ACTINOGRAPH (Gk., *aktis*, ray, beam, *graphein*, to describe), an instrument for measuring and recording the variations in the *actinic* or chemical force of the solar rays. By the *actinic* force is meant that power in the sun's rays by which chemical changes are produced, as in photography. The *intensity* of the sun's actinic rays is measured by an instrument called an *actinometer*.

ACTINOMETER, an instrument to measure the heat of the sun's rays; at first a common thermometer, the bulb blackened with nitrate of silver; then one with a large bulb filled with blue solution of ammonia and sulphate of copper, inclosed in a box with a plate-glass top, the expansion of the liquid to indicate the amount of heat. Prof. John W. Draper of N. Y. next discovered that equal volumes of chlorine and hydrogen form chlor-hydric acid in direct proportion to the actinic intensity of the light and the time of exposure. Subsequently Bunsen and Roscoe hit upon the same plan. There are other actinic reactions; as, in a solution of chloride of gold and oxalic acid, the gold precipitates on exposure to actinic rays.

ACTION, in its large and general sense, means a judicial proceeding before a competent tribunal for the attainment of justice; and in this sense it is applied to procedure, whether *criminal* or *civil*. In its more limited acceptation, it is used to signify proceedings in the *civil* courts, where it means the form prescribed by law for the recovery of a right, or what is one's due. In the law of England, the term *A.* used to be applied to proceedings in the courts of *common law*, as distinguished from those of *equity*, where the word *suit* was used. What, in the courts of queen's bench, common pleas, and exchequer, before the judicature act of 1873, was called action-at-law, was in the courts of equity called a suit in equity. See COMMON LAW, COURTS OF, and EQUITY.

In the Scotch law, which recognizes no distinction in legal administration between law and equity, the word *A.* is defined comprehensively as a demand regularly made and insisted on before the judge competent for the recovery of a right. Accordingly, while in Scotland there is, as in England, a remedy for every wrong, the law recognizes and gives effect to the right of a party to claim and to have *declared* a particular interest or right, even although that interest or right may not be withheld, or called in question. It is sufficient that it is doubtful, and that the ascertainment of it is necessary for the position and purposes of the plaintiff, or *pursuer*, as the Scotch law calls the active party. This procedure is known by the name of an *A. of declarator*, which has been described as a suit in which something is prayed to be decreed in favor of the plaintiff, but nothing sought to be paid, performed, or done by the defendant. Lord Stair, in his

Institutes of the Law of Scotland, says, "such actions may be pursued for instructing or clearing any kind of right relating to liberty, dominion, or obligation;" and he further observes, "there is no right but is capable of declarator." Various attempts have been made to introduce this mode of proceeding into the practice of the law in England, but as yet without success. The idea of the declarator has been said to have been derived by the Scotch lawyers from the French legal system, according to whose forms the existing administration of the Scotch law was originally molded. In the institutes of Justinian there are, however, indications of the partial use of this form of A. by the Roman lawyers.

We may add that the word A. is derived from the Latin *actio* (*agere*), and that the plaintiff in a suit or action was originally said to be the *actor*, which, indeed, in the recorded pleadings of the Scotch courts, his counsel or advocate still is called.

In general, it may be said that no action can be maintained by a citizen against a government without the government's express consent; except in rare special cases no suit can be brought by a citizen against the U. S.; relief must be sought by petition, or in the court of claims. State courts do not ordinarily contest acts of foreign states or sovereigns for anything done or omitted in their public character. Here negotiation takes the place of suit. Modern statutes have much simplified proceedings under this title, and many old forms have been abandoned. In N. Y. an effort has been made to avoid all distinctive forms; there every other than a criminal is a civil action, having no other specific name; the design of the code being to give by this action every kind of relief which can be sought in civil causes.

ACTIUM (now Azio), a t. and promontory on the w. coast of Greece, at the entrance of the Ambraciot bay, now the gulf of Arta, is memorable for the sea-fight which took place near it, 2d Sept., 31 B.C., between Octavianus (afterwards the emperor Augustus) and Marcus Antonius. These two had for some time ruled the Roman world between them—the former in the w., the latter in the e.; it now came to a struggle for the sole sovereignty. The two armies were encamped on the opposite shores of the gulf: Octavian had 80,000 infantry, 12,000 cavalry, and 260 ships of war; Antony, 100,000 infantry, 12,000 cavalry, and 220 ships. Antony's ships were large and well provided with engines for throwing missiles, but clumsy in their movements; Octavian's were smaller and more agile. Antony was supported by Cleopatra, queen of Egypt, with 60 vessels, who induced him, against the opinion of his most experienced generals, to determine upon a naval engagement. The battle continued for some hours undecided; at last, Agrippa, who commanded Octavian's fleet, succeeded, by a skillful maneuver, in compelling Antony to extend his line of battle, whose compactness had hitherto resisted all attempts of the enemy to break through. Cleopatra, whose ships were stationed behind Antony's line, apprehensive of that line being broken, took to flight with her auxiliary fleet, and Antony recklessly followed her with a few of his ships. The deserted fleet continued to resist bravely for some time, but was finally vanquished; the land-army, after waiting in vain seven days for Antony's return, surrendered to Octavian. As a memorial of the victory that had given him the empire of the world, and out of gratitude to the gods, Octavian enlarged the temple of Apollo at A., dedicated the trophies he had taken, and instituted games to be celebrated every five years. He also built, on the spot where his army had been encamped, the splendid city of Nicopolis (city of victory), near where Prevesa now stands.

ACT OF PARLIAMENT is a resolution or law passed by all the three branches of the legislature—the king [or queen], lords, and commons. The expression is generally used to signify the *record* of an A. of P., and such records are strictly synonymous with the term "statutes," or "statutes of the realm." An A. of P. thus made is the highest legal authority acknowledged by the constitution. It binds every subject in the land, and even the sovereign himself, if named therein. And in England it cannot be altered, amended, dispensed with, suspended, or repealed, but in the same forms and by the same authority of parliament. In Scotland, however, a long course of contrary usage or of disuse may have the effect of depriving a statute of its obligation; for, by the Scotch law, a statute may become obsolete by disuse, and cease to be legally binding. It was formerly held in England that the king might in many cases dispense with penal statutes; but by the statute 1 W. and M. st. 2, c. 2, it is declared that the suspending or dispensing with laws by royal authority, without consent of parliament, is illegal.

An A. of P. or statute is either *public* or *private*. A public act regards the whole community, but the operation of a private act is confined to particular persons and private concerns, and some private acts are *local*, as affecting certain places only. As the law till lately stood, the courts of law were bound *ex officio* to take judicial notice, as it is called, of public acts—that is, to recognize these acts as known and published law, without the necessity of their being specially pleaded and proved; but it was otherwise in regard to private acts; so that in order to claim any advantage under a private act, it was necessary to plead it, and set it forth particularly. But now, by the 13 and 14 Vict. c. 21, s. 7, every act made after the then next session of parliament is to be taken to be a public one, and judicially noticed as such, unless the contrary be expressly declared.

Acts of P. are also sometimes described as *declaratory*, or *penal*, or *remedial*, according to the nature of their object or provisions. Declaratory statutes are where the old

custom of the kingdom has almost fallen into disuse, or become disputable, in which case the parliament has thought proper (*in perpetuum rei testimonium*, and for avoiding all doubts and difficulties) to declare what the common law is and ever has been. Penal acts are those which merely impose penalties or punishments for an offense, as in the case of the statutes relative to game. Remedial acts are such as supply some defect in the existing law, and redress some abuse or inconvenience with which it is found to be attended, without introducing any provision of a penal character. There is also a distinction of Acts of P. as being either *enlarging or restraining, enabling or disabling* acts.

An A. of P. begins to operate from the time when it receives the royal assent, unless some other time be fixed for the purpose by the act itself. The rule on this subject, in England, was formerly different; for at common law, every A. of P., which had no provision to the contrary, was considered, as soon as it passed (i.e., received the royal assent), as having been in force, retrospectively, from the first day of the session of parliament in which it passed, though, in fact, it might not have received the royal assent, or even been introduced into parliament, until long after that day; and this strange principle was rigidly observed for centuries. The ancient acts of the Scotch parliament were proclaimed in all the county towns, burghs, and even in the baron courts. This mode of promulgation was, however, gradually dropped as the use of printing became common; and in 1581 an act was passed declaring publication at the market cross of Edinburgh to be sufficient. British statutes require no formal promulgation; and in order to fix the time from which they shall become binding, it was enacted by the 33 Geo. III. c. 13, that every A. of P. to be passed after 8th April, 1793, shall commence from the date of the indorsement by the clerk of parliament, stating the day, month, and year when the act was passed and received the royal assent, unless the commencement shall, in the act itself, be otherwise provided for.

An A. of P. consists of various parts—such as the title, the preamble, the enacting sections and clauses, and sometimes certain forms or schedules added by way of appendix—and it is referred to by the year of the sovereign's reign, and the chapter of the statutes for that year. The old acts of the Scotch parliament, before the union with England, are cited by the year in which they were passed, and the order of the number or chapter. See STATUTES, SCOTCH STATUTES, and PARLIAMENT.

ACT OF SETTLEMENT, a name given to the statute 12 and 13 Will. III. c. 2, by which the crown was limited to the family of the present sovereign, Queen Victoria. It was toward the end of King William III.'s reign, when all hopes of other issue died with the duke of Gloucester, that, as we are told by Blackstone, the king and parliament thought it necessary again to exert their power of limiting and appointing the succession, in order to prevent another vacancy of the throne, which must have ensued upon their deaths, as no further provision was made at the revolution than for the issue of Queen Mary, Queen Anne, and King William. The parliament had previously, by the statute of 1 W. and M. st. 2, c. 2, enacted, that every person who should be reconciled to or hold communion with the see of Rome, should profess the Roman Catholic religion, or should marry a Roman Catholic, should be excluded from succession to, and be forever incapable to inherit, possess, or enjoy the crown; and that in such case the people should be absolved from their allegiance, and the crown should descend to such persons, being Protestants, as would have inherited the same, if the person so reconciled, holding communion, professing or marrying, were naturally dead. To act, therefore, consistently with themselves, and, at the same time, pay as much regard to the old hereditary line as their former resolutions would admit, they turned their eyes on the Princess Sophia, electress and duchess-dowager of Hanover; for upon the impending extinction of the Protestant posterity of Charles I., the old law of regal descent directed them to recur to the descendants of James I.; and the princess Sophia, being the youngest daughter of Elizabeth, queen of Bohemia, who was the daughter of James I., was the nearest of the ancient blood-royal who was not incapacitated by professing the Roman Catholic religion. On her, therefore, and the heirs of her body, being Protestants, the remainder of the crown expectant on the death of King William and Queen Anne without issue, was settled by statute 12 and 13 Will. III. c. 2. And at the same time it was enacted that whosoever should thereafter come to the possession of the crown, should join in the communion of the church of England as by law established.

This is the last limitation of the crown that has been made by parliament; and the several actual limitations, from the time of Henry IV. to the present, clearly prove the power of the king and parliament to remodel or alter the succession. It is even made highly penal to dispute such power, for by the statute 6 Anne, c. 7, it is enacted, that if any person maliciously, advisedly, and directly shall maintain, by writing or printing, that the kings of this realm, with the authority of parliament, are not able to make laws to bind the crown and the descent thereof, he shall be guilty of high treason; or if he maintains the same by only preaching or advised speaking, he shall incur the penalties of *premunire*.

The Princess Sophia dying before Queen Anne, the inheritance, thus limited, descended on her son and heir, King George I.; and having, on the death of the queen, taken effect in his person, from him it descended to King George II.; from him to his grandson and heir, King George III.; from him to his son George IV., who was succeeded

by his brother, William IV.; and from the monarch last mentioned the crown descended to his heiress, the daughter of his brother Edward, duke of Kent, the present sovereign Queen Victoria.

"Hence," Blackstone remarks, "it is easy to collect that the title to the crown is at present hereditary, though not quite so absolutely hereditary as formerly; and the common stock or ancestor from whom the descent must be derived is also different. Formerly, the common stock was King Egbert, afterwards William the Conqueror, and now it is princess Sophia, in whom the inheritance was vested by the new king and parliament. Formerly, the descent was absolute, and the crown went to the next heir without any restriction; but now, upon the new settlement, the inheritance is conditional; being limited to such heirs only of the body of the princess Sophia as are Protestants, members of the church of England, and are married to none but Protestants."

ACT OF UNIFORMITY is the name by which the English statute 13 and 14 Car. II. is usually described. By that statute it was enacted that the book of common prayer, as then recently revised, should be used in every parish church and other place of public worship in England, and that every school-master and person instructing youth should subscribe a declaration of conformity to the liturgy, and also to the effect of the oath and declaration mentioned in the act of 13 Car. II. st. 2, c. 1. It further enacted that no person should thenceforth be capable of holding any ecclesiastical promotion or dignity, or of consecrating or administering the sacrament, till he should be ordained priest according to episcopal ordination, and with respect to all ministers who then enjoyed any ecclesiastical benefice, it directed that they should, within a certain period, openly read morning and evening service, according to the book of common prayer, and declare before the congregation their unfeigned assent and consent to the use of all things therein contained, upon pain of being *ipso facto* deprived of their spiritual promotions. By this statute, 2000 of the clergy, who refused to comply, were deprived of their preferments. Acts to secure uniformity were passed under Edward VI. (1549) and Elizabeth (1559).

ACTON, Sir JOHN FRANCIS EDWARD, 1737-1811. He was a native of Besançon, son of Edward Acton, a physician. He served in the French and Tuscan navies, commanding a frigate in the expedition against Algiers in 1774. For gallantry in rescuing some thousands of Spanish soldiers from slavery he was promoted, becoming commander-in-chief of the Neapolitan sea and land forces; next, minister of finance, and finally prime minister. His measures, prompted by his extreme hatred of France, were intolerant, and ultimately caused a reaction against the royal family of Naples, in favor of the French party and the Carbonari. When the French entered Naples in 1806 he fled to Sicily, where he died, condemned by all parties; though there is doubt about his responsibility for the ill treatment of political prisoners. He married, by papal dispensation, the daughter of his brother Joseph, who was also engaged in the Neapolitan service.

ACTON, LORD JOHN EMERICH EDWARD DALBERG, English historian, b. at Naples, 1834. He was brought under the influence of Dr. Döllinger, whose "Old Catholic" views he adopted, zealously opposing the dogma of papal infallibility. He has edited and contributed articles to magazines and won a high reputation both for learning and for vigor of expression. In 1895 he was appointed regius professor of modern history at Cambridge.

ACTS OF THE APOSTLES, the fifth book of the New Testament, the authorship of which is ascribed by tradition, and with the highest probability, to the evangelist Luke. Beginning with the ascension of Christ, it gives an account of the spread of the Christian church; confined, however, chiefly to the part taken therein by the apostle Paul. Notwithstanding its title, little is said of the other apostles, with the exception of Peter. The narrative closes with the year 62 A.D., Paul being then a prisoner at Rome. The book has always been received as canonical, except by a few Manichaean heretics; but its historical character has been impugned by the Tübingen school. Spurious acts were put in circulation by early Christian sects. The introduction to the Acts of the Apostles connects it with the third gospel as written by the same author and addressed to the same person. That both were from the same hand is also to be inferred from the similarity of style, idiom, and diction. In modern times some writers have attempted a criticism invalidating both the external testimony on this point and the internal probabilities and proofs. A single specimen may be given of the reasoning on which they rely for dislodging this book from its place in scripture, or at least for lowering the estimation in which it is held. "According to the gospel ascribed to Luke, all the events related of Jesus after the resurrection took place, or seem to have taken place, on the day of the resurrection, or they may possibly have extended into the next morning, but certainly not later. The A. on the contrary states that Jesus was seen by the disciples for forty days after the resurrection." This is a summary way of developing a contradiction where none exists. The account of these events in Luke's gospel is indeed brief and condensed, but it does not assert or imply that they all took place at once. Points in the narrative fairly admit, and rationally require, the supposition of intervals of time. The other gospels, also, declare or imply such intervals. The accounts of Matthew and Mark are more condensed than even Luke's. John's is much more extended. It marks off expressly several intervals, and says that one of them was a week long. All these accounts, therefore, taken together, prepare the way for the statement in the A. that the whole time between the resurrection and the ascension amounted to 40 days. The Greek title, it will be observed, does not indicate that the book contains a complete history of the apostles of Christ in their work of proclaiming the gospel. It is not "the

acts" (which indeed the English translation does make it), as if all were intended, but "acts" as only a part. This is in strict accordance with the contents. In the opening of the book, the names of the eleven apostles and of the twelfth (chosen to fill the place of Judas) having been given, the actions and words of Peter at once become prominent; then Peter and John are mentioned together, and soon Peter's course only is given. After 12 chapters, of which the larger part of one relates to Paul's conversion, the rest of the book is filled chiefly with this last apostle's work and things connected with it. Jerusalem, the church, and the apostles there, scarcely appear except as connected with Paul. The narrative ends with the year 62 A.D.

The contents of the book may be noted as follows:

I. *An exhibition of the ever-present, controlling, and administrative agency of the Lord Jesus*, from his exalted sphere at the right hand of God, putting forth the powers of his risen life and giving organization to his spiritual and everlasting kingdom. We have his commands to the apostles, his direction of the choice of Judas's successor, his sending down the Holy Spirit, his turning men from their sins and adding them to his church, his working of miracles by the instrumentality of the apostles, his sending Peter to open the door of faith to the Gentiles and Philip to guide the Ethiopian in his effort to understand the scripture, his delivering Peter from prison and Paul from his mad career.

II. *A record of the gift and operations of the Holy Spirit*. The Savior at the close of his work on earth promised that he would send from the Father the Spirit of truth to abide with his disciples, to reveal the truth to them and to convince the world of sin, righteousness, and judgment. The A. records the fulfillment of the promise and exhibits the work of the Holy Spirit in the minds and hearts of men of various nations. It thus becomes the connecting link between the gospels and the epistles which describe the spirit's progressive work.

III. *The account of the planting and spread of the Christian church*. It records the names of the apostles, the number of the original company at Jerusalem, and the beginning of the church there. It shows that the life of Jesus was appealed to among those who had witnessed it; that his Messiahship was defended in the hearing of those who had crucified him for asserting it; that the divine appointment of his death was proclaimed in the midst of those who had inflicted it as a malefactor's doom; that his resurrection was affirmed in the face of those who had buried him and exercised official guardianship over his grave; that the first adherents to his religion were gained among the crucifiers themselves, including priests as well as the people; that the faith in him spread immediately among Jews and proselytes, then in Jerusalem, who belonged to the chief countries of the Roman empire, and to some beyond its bounds; and that, the Gentiles being speedily admitted by divine command to the full blessings of salvation, the church was rapidly extended into Judea, Samaria, Phenice, Cyprus, Syria, Asia Minor, Illyria, and Italy.

IV. *Conclusive evidence of the divine origin of Christianity*. It shows that, advancing from a very small beginning, by the instrumentality of unarmed men, opposed by the power of the Roman empire; of private persons, opposed by the authority of the Jewish and pagan priesthoods; of unlettered men, opposed by all the culture of the times, it prevailed over the mightiest institutions, the most formidable barriers, the most malignant persecutions, and prevailed by the power of God. When the historian Gibbon was investigating the decline and fall of the Roman empire he found that "an inquiry into the progress and establishment of Christianity constituted an essential part of the history of the Roman empire." "While that great body," he says, "was invaded by open violence or undermined by slow decay, a pure and humble religion gently insinuated itself into the minds of men, grew up in silence and obscurity, derived new vigor from opposition, and finally erected the triumphant banner of the cross on the ruins of the capitol." His curiosity having been awakened "to inquire by what means the Christian faith obtained so remarkable a victory over the established religions of the earth," he ventures to give what he calls five secondary causes of the rapid growth of the Christian church. All these are *vital portions of Christianity*, and, as stated by him, they are seen to amount to this, that it was the prevalence of Christianity that promoted the triumph of Christianity, as a great conflagration is promoted by the spreading of the flames. The book of A. supplies the necessary beginning to Gibbon's account by showing how the fire was kindled, how the essential elements of Christianity were produced. His causes are: 1. "*The zeal of the Christians*;" and the A. informs us how the Christians came into existence and how their zeal was first produced and then "purified." 2. "*The doctrine of a future life*;" and the A. declares the source whence the doctrine was obtained and "improved." 3. "*The miraculous powers ascribed to the primitive church*;" and the A. explains how the primitive church began, and on what evidence the miraculous powers were so ascribed to it as to secure its triumph. 4. "*The pure and austere morals of the Christians*;" and the A. reveals how their morals came to be pure and austere, in the midst of an abounding corruption too horrible to be looked upon, and nowhere more fully revealed than in Gibbon's own work. 5. "*The union and discipline of the Christian republic*;" and the A. demonstrates how the church came to be "*a republic in the midst of the empire*," in what its "union" consisted, how its "discipline" was maintained, and by what power "it became an independent and increasing state."

V. *The close of Scripture history in relation to the Jews.* In the great interest awakened by the book as recording the first preaching to the Gentiles, comparatively little notice is taken of the fact that it records also the last preaching to the Jews. The book opens with the preaching of the gospel to the Jews, the acceptance of it by some of them, and the bitter opposition made to it by the rest which at length drove away a large part of the Christians from Jerusalem and in a great degree brought the preaching to the Jews there to an end. When Paul came there after his conversion he began to preach zealously to the Jews, but they would not receive his word, and he was commanded by the Lord to leave the city. At Antioch, in Pisidia, he preached earnestly to Jews and Gentiles, but when the former contradicted and blasphemed he turned, by divine command, to the latter. A similar result was witnessed in Iconium, Lystra, Thessalonica, Berea, Corinth, and Ephesus. When, late in life, he went again to Jerusalem, as it proved for the last time, the opposition of the Jews was more furious than before, and after a narrow escape from death at their hands and an imprisonment, continuing more than two years, through their instrumentality, he was constrained to appeal unto Cæsar. Three days after his arrival at Rome he sent for the resident Jews, and had a day appointed for making known the gospel to them, on which, from morning to evening, he expounded, testified, and persuaded concerning Jesus out of the law and the prophets. The result then was that some believed and others believed not; and again Paul turned to the Gentiles. With this narrative the A. ends, abruptly, as many say, with respect to Paul and the gospel, but appropriately with respect to the Jews. If no reason can be shown why Christian history should here be cut short, certainly it was necessary that Jewish history should here come to an end. For, in a little while after Paul's imprisonment at Rome, Jerusalem was destroyed and the Jews were scattered abroad. And thus the A. completes the unity of the historical books of scripture whose constant and ultimate, though not always direct, reference is to the Jews.

ACTS, SPURIOUS OR APOCRYPHAL, are treatises or sentences which purport to have been written by or concerning Christ, the apostles and other disciples. Many of these are now known only through the statements of ancient authors. Others are extant. I. One class profess to be words of Christ, and are supposed by some writers to have been derived from early accounts concerning him, of which many had been written before the gospel of Luke (i. 1). Some of them, in all probability, were merely inaccurate quotations from the genuine gospels; others have no external testimony to establish their genuineness and no merit to make them worthy of regard. The beautiful words, not recorded in the gospels, which Paul quoted to the Ephesians as words of Christ, "It is more blessed to give than to receive," are not properly included in the class now described, for they are vouched for as genuine words of Christ, by an inspired apostle who had many ways of learning the truth about them, and have always had a place in an undisputed book of the New Testament. II. Many spurious treatises called *Acts of the Apostles* were written at now unknown dates. Of some of these little more is known than that they once existed; of others fragments remain, and several are extant entire. A selection was printed at London in 1821 under the title, *Apocryphal New Testament*. They abound in fabulous, puerile, and visionary statements which are unworthy of notice. III. Among the treatises of this general class, the A. of Pilate deserves to be singled out as probably genuine and valuable. It is well known that accounts of all important events that occurred at Rome were carefully preserved either in the *Acts of the Senate* or the *Daily Acts of the People*. In like manner it was the duty of the governors of provinces to send to the senate or the emperor reports of their administration, including accounts of the remarkable transactions that occurred in their region. These were called the "acts" of their government, and were not published for general perusal, but deposited among the archives of the empire, as are state papers now, for information to historians. There is every reason to believe that Pilate sent such a report of his administration to Rome, and that it included an account of Jesus who was called Christ. And it is certain that the primitive Christians, in defending their faith, appealed to these A. of Pilate as to testimony which could not be denied. Justin Martyr, in his first defense of the Christians, presented, 140 A.D., to the emperor and senate, having mentioned the crucifixion of Jesus and some of the events connected with it, says: "That these things were so done, you may know from the acts made in the time of Pontius Pilate." And again, having recounted some of the miracles of Jesus, such as healing diseases and raising the dead, he adds: "And that these things were done by him you may know from the acts made in the time of Pontius Pilate." Tertullian, also, in his defense of Christianity, 200 A.D., says: "Of all these things relating to Christ, Pilate himself sent an account to Tiberius, then emperor." See APOCRYPHA.

ACTUARY. The *actuarii*, in ancient Rome, were clerks who recorded the *acta* of the senate and other public bodies. The term might therefore, so far as its etymology is concerned, be applied to men of business in general. But in the constantly increasing tendency to subdivide labor and specialize functions, there has arisen, in recent times, a distinct branch of business, embracing all monetary questions that involve a consideration of the separate or combined effect of interest and probability, especially as connected with the duration of human life; and it is to one who devotes himself to this department of business that the name of A. has been specially assigned. The investigations and calcu-

lations of the A. supply the principles of operation for the numerous institutions now engaged in the transaction of life-assurance, annuity, and reversionary business. His functions might be briefly defined as *the application of the doctrine of probabilities to the affairs of life.*

ACULEUS, in botany. See PRICKLE.

ACUPRESSURE, a mode of arresting hemorrhage from cut arteries. It is based on the principle of temporary metallic compression, and was first suggested to the scientific world by Sir James Y. Simpson, bart., in a paper read before the royal society of Edinburgh, Dec., 1859. The simplest mode of practicing it may be thus described: The needle is passed through the flaps or sides of the wound, so as to cross over and compress the orifice of the bleeding artery, just as in putting a flower in the lapel of one's coat, one crosses over and compresses the flower-stalk with a pin pushed twice through the lapel. The middle portion of the needle—the only part of it which is in immediate contact with the fresh surface of the wound—bridges over and compresses the artery at its bleeding orifice, or perhaps a line or two more on its cardiac side. The head and point of the needle are exposed externally on the cutaneous surface of the flap or side of the wound. "When passing the needle in this method," says Sir J. Y. Simpson, "the surgeon usually places the point of his left forefinger or of his thumb upon the mouth of the bleeding vessel, and with his right hand introduces the needle from the cutaneous surface, and passes it right through the whole thickness of the flap till its point projects for a couple of lines or so from the surface of the wound, a little to the right side of the tube of the vessel. Then, by forcibly inclining the head of the needle towards his right, he brings the projecting portion of its point firmly down upon the site of the vessel; and after seeing that it thus quite shuts the artery, he makes it re-enter the flap as near as possible to the left side of the vessel, and pushes on the needle till its point comes out again at the cutaneous surface. In this mode, we use the cutaneous walls and component substance of the flap as a resisting medium, against which we compress and close the arterial tube. But in some wounds, a neighboring bone or other firm unyielding texture forms the best and readiest point of resistance against which to pin and compress the artery by the *acupressure* needle." Surgeons now seldom use *acupressure*.

ACUPUNCTURE (Lat., puncturing or pricking with a needle [*acus*]) is a very ancient remedy, and one practiced extensively in the east, for the cure of headaches, lethargies, etc. In Europe it is principally employed to relieve neuralgic pains, and these of chronic rheumatism. Steel needles are made use of, about 3 in. long, and set in handles. The surgeon, by a rotatory movement, passes one or more to the desired depth in the tissues, and leaves them there from a few minutes to an hour. Their insertion is accompanied by no pain, except the first prick—a fact the quacks of the 16th c. did not fail to take advantage of. According to Jerome Cardan, they traveled from place to place practicing A., and before inserting the needle, they rubbed it with a peculiar kind of magnet, either believing, or pretending, that this made the operation painless. The relief to pain afforded by this simple operation is sometimes astonishing, and the wounds are so minute as to be perfectly harmless.—The needles are sometimes used as conductors of the galvanic current to deep-seated parts, and are sometimes made hollow—on the suggestion of Dr. Alexander Wood of Edinburgh—to allow of a small quantity of some sedative solution being injected into the tissues, by which even the terrible pain of *tic-douloureux* may be almost immediately relieved. See NEURALGIA.

ACUTE DISEASES. See DISEASE.

ADA, a co. in s.w. Idaho, on Snake river, near the Oregon border; organized in 1864; 2500 sq.m.; pop. '90, 8368. Mining is the principal business. Co. seat, Boise city, which is the capital of the state.

A'DA, a t. of the Austrian empire, in Hungary, 8 m. s. of Zenta. Pop., 11,100.

ADAFU'DIA, a t. of the Felattah country, w. Africa, about 400 m. s.e. from Timbuctoo, in about 13° 6' n. lat., and 1° 3' e. long. It is situated in a dry, healthy, and fertile plain, and is surrounded by a mud wall. Pop. supposed to be about 24,000. A large trade is carried on, and slaves form a principal part of the merchandise.

ADAGIO, a slow movement or measure of time in music, between *largo*, *grave*, and *andante*. In our more extended compositions of instrumental or chamber music, the second or third *movement* is generally marked *adagio*, and serves as a contrast with the rapid and energetic movement of the preceding and following parts of the sonata or symphony. The A. must be written in a measure of time which will afford scope for a flowing and expressive slow melody with a gracefully varied accompaniment. Without contrasted movement and a lively variety in the accompaniment, the slow air would have a monotonous or dull effect. A clear and expressive execution of the A. is a sure test of ability and good taste in the player or singer, as it demands a pure and beautiful intonation, a true reading and phrasing of the cantilena, even in its most minute details, and a careful attention to all points of effect. The finest specimens of the A. are found in the works of the old masters, Haydn, Mozart, and Beethoven, and are as distinct in their features as

were the composers in their personal characteristics. In recent works, our composers have generally succeeded better in their rapid movements than in the A.

ADAIR', a co. in s.w. Iowa, on the head streams of Nodaway river; 576 sq.m.; pop. '90, 14,534. The surface is mostly level; the chief productions are agricultural. Co. seat, Greenfield.

ADAIR', a co. in s. Kentucky; 400 sq.m.; pop. '90, 13,721, with colored. The surface is hilly, with good timber and fertile soil; there is plenty of water power, with several factories; chief products, corn and tobacco. Co. seat, Columbia.

ADAIR', a co. in n.e. Missouri, on Chariton river; 570 sq.m.; pop. '90, 17,417, with colored. The chief products are corn and tobacco. Co. seat, Kirksville.

ADAIR', Sir ROBERT, 1763-1855; b. in London; son of a sergeant-surgeon to George III. and a relative of Charles James Fox. He entered parliament in 1803 as a whig; in 1806 Fox sent him to Vienna, and in 1808 Canning sent him on a special mission to Turkey, where he concluded the treaty of the Dardanelles. He remained English representative in Turkey until 1811. In 1831 he was sent to the new kingdom of Belgium, and was prominent in later peace negotiations. In 1835 he retired with the rank of privy counselor. At the age of 82 he wrote memoirs of his residence at Vienna and elsewhere abroad.

ADAL' and **ADEL**. The name Adal is applied by geographers to the flat country lying between Abyssinia and the Red sea, from Massowah, in n. lat. 15° 40', to the bay of Tajurra, lat. 11° 30'. Adel would seem to designate the coast-country from Tajurra to cape Guardafui, part of which is known as the country of the Somaui.

AD'ALBERT, a French bishop and missionary to the German heathen, about the middle of the 8th c. St. Boniface charged him with heresy in giving his own hair and nails as relics, and he was condemned to execution, but died in prison. His few disciples were called Adalbertines.

AD'ALBERT, SAINT, d. 997, "the apostle of the Prussians." He was educated at Magdeburg; in 983 chosen bishop of Prague; failing to convert the Bohemians, he retired to a monastery near Rome; went back in 993, but again retired in discouragement; in 995 he baptized the future St. Stephen, the first king of the Hungarians; at last went as a missionary to Poland and Prussia, and was murdered by the natives.

AD'ALBERT, d. 1072. He was made archbishop of Bremen in 1043 by Henry III., whom he accompanied to Rome, where he became a candidate for the papacy, barely missing the election. Leo IX. made him his legate in the north. During the minority of Henry IV., A. and Archbishop Hanno, of Cologne, usurped the administration of the empire, but he became obnoxious to the princes, and they succeeded in separating him from the emperor; however, he soon after regained his influence and kept it as long as he lived.

AD'ALBERT, HEINRICH WILHELM, 1811-73; b. Berlin; prince, and cousin of the emperor of Germany. He went into the artillery service in the army of Prussia when young, but having a taste for travel he visited most of the countries of Europe, and crossed the ocean to Brazil. In 1848 he was charged with organizing the German navy, and made admiral. In 1856 he made a voyage in the Mediterranean, and was slightly wounded in a fight with pirates off Morocco. He became commander of the marine of Prussia, and when the German empire was established was continued inspector-gen. of the new marine. He was under medium height and in no way conspicuous, unless for carelessness in dress; but he was sharp withal, and jovial. In 1850 he made a morganatic marriage with Baroness von Barmin (Thérèse, the dancer, and sister of Fanny Elssler). They had a son who died young.

ADA'LIA, anciently *Attalia*, the chief seaport on the s. coast of Asia Minor, in n. lat. 36° 52', e. long. 30° 45'. The streets rise like the seats of a theatre, up the slope of the hill behind the harbor. Pop. 13,000.

ADAM (of Bremen), an old historical writer, whose work, entitled *Gesta Hammenburgensis Ecclesie Pontificum* gives a history of the archbishopric of Hamburg from 788 A.D. to the death of the archbishop Adalbert in 1072. This work has great historical value; in addition to its notices of ecclesiastical affairs, it gives accounts of the northern Slavonic tribes, which the author collected during a visit to the Danish king Svend Estrithson. A. was canon and *magister scholarum* at Bremen from 1067 to the time of his death, which took place in 1076.

ADAM, ADOLPHE CHARLES, composer, b. in Paris in 1803; d. there in 1856. In 1817 he entered the conservatory, and studied composition under Boieldieu; began writing piano fantasies and variations; wrote the operas of "Pierre et Catherine" in 1829, and the "Postillon de Longjumeau," in 1836, by which he is best known. His autobiography and souvenirs were published (Paris, 1860). See *Adolphe Adam, sa vie*, etc., by A. Pouglin.

A'DAM, ALBRECHT, 1786-1862; d. Munich. He studied painting in Nuremberg; served in the Austrian campaigns against Napoleon, but subsequently served with Beauharnais, and painted the battle-scene of Lobau. He accompanied Eugène in the campaign of 1812 as far as Moscow, and prepared drawings to illustrate Eugène's

military career; painted several large war pictures—his last being the “Battle of the Moskva,” for King Louis of Bavaria.

ADAM, JEAN (1710–1765), was a Scotch poetess, who was born near Greenock, Scotland. In her earlier life she was a teacher; leaving that, after a time, she became a street vender, crying her wares on the street. She lived a joyless life, and died in the Glasgow poorhouse. She published a volume of religious poems in 1734. It is claimed for her that she is the author of “There’s nae Luck aboot the House;” but the quality of her poems does not seem to support the claim.

ADAM, MME. JULIETTE. See **LAMBER, JULIETTE.**

ADAM, ROBERT, a distinguished architect, was born at Edinburgh in 1728. His father, William Adam, of Maryburgh, in Fifeshire, was also an architect of no mean repute. After receiving a university education, Robert A. proceeded in 1754 to Italy, and thence to Dalmatia, where he devoted some time, in conjunction with Clerisseau, a French architect, to exploring and making drawings of the ruins of Diocletian’s palace at Spalatro. On his return to Britain he rapidly rose to distinction, was appointed architect to the king, and obtained extensive employment. The publication, in 1764, of the results of his labors at Spalatro, contributed to his reputation. ♦ In opposition to the heavy style of architecture prevalent at the time, A. introduced a taste for lightness and decoration, which, however, tended to the opposite extreme of weakness and triviality. Those, however, who form the lowest estimate of the general character of his designs, grant him the merit of having effected great reforms in British domestic architecture generally. In 1768 A. was elected M.P. for the county of Kinross. During upwards of twenty-five years, his practice, in partnership with his brother James, was more extensive than that of any other architect of the time. In 1773, the brothers commenced to publish a series of engravings of their chief designs, which was continued for some years. Robert died in 1792, and was buried in Westminster Abbey. The most generally admired of his works is the register house, Edinburgh. Kedleston hall, near Derby, is regarded by some as his greatest work. Among his other principal works are the university buildings and St. George’s church, Edinburgh (both altered from the original design), the Glasgow infirmary, the Adelphi buildings, London, the screen to the admiralty, Caen-wood house, Luton house (altered), Lansdowne house, etc.

ADAMANTINE SPAR. See **CORUNDUM.**

ADAMANT. (Gr. *a*, neg., *damao*, I tame.) A term now used to express any substance of extraordinary hardness. The name was attached to a supposed stone, or mineral, as to the properties of which vague notions long prevailed. It was identified with the lodestone or magnet, and often used as synonymous with it by early writers. This confusion ceased with the 17th century, but the word, for a long time, had currency among scientific writers as a synonym with diamond. The use of the term to denote the lodestone seems to have been due to the early Latin medical writers, who apparently derived the word from the Latin *adamare*, “to have an attraction for.”

ADAM and EVE. The narrative of the creation and fall of A. and E. is given in Genesis. To the scriptural account the later Jewish writers in the Talmud have made many tasteless additions. They tell us that the stature of A., when first created, reached to the heavens, while the splendor of his countenance surpassed that of the sun. The very angels stood in awe of him, and all creatures hastened to worship him. Then the Lord, in order to show the angels his power, caused a sleep to fall on A., and removed a portion of every limb. A. thus lost his vast stature, but remained perfect and complete. His first wife was *Lilith*, the mother of demons; but she fled from him, and afterwards E. was created for him. At the marriage of A. and E., angels were present, some playing on musical instruments, others serving up delicious viands; while the sun, moon, and stars danced together. The happiness of the human pair excited envy among the angels, and the seraph Sammael tempted them and succeeded in leading them to their fall from innocence.—According to the Koran, all the angels paid homage to A., excepting Eblis, who, on account of his refusal, was expelled from paradise. To gratify his revenge, Eblis seduced A. and E., and they were separated. Adam was penitent, and lived in a tent on the site of the temple of Mecca, where he was instructed in the divine commandments by the archangel Gabriel. After 200 years of separation, he again found E. on Mt. Arafat. Many other traditions of the Jews and the Mohammedans respecting A. and E. may be found in Herbelot’s *Bibliothèque Orientale*.—In the system of the Christian Gnostics and Manichæans, A. is one of the highest æons.—According to the Calvinistic theology, A. was the *covenant head* or *federal representative* of the whole human race, who were thus involved in the consequences of his breach of the *covenant* (q. v.) which God made with him at his creation. This view is supported by reference to the parallel drawn between A. and Christ in Rom. v. and 1 Cor. xv., in the latter of which chapters Christ is called, in contradistinction to A., “the second man,” and “the last A.”

ADAM DE LA HALLE, **ADAMAURA**, or “The Hunchback of Arras,” one of the wandering poets or *trouvères* of the 13th c., b. in Arras Artois, about 1240, d. in Naples between 1285–8. He was in the suite of count Robert of Artois in 1282, and Charles d’Anjou, whom he followed to Egypt, Syria, Palestine, and Italy. A.’s works were superior to those of most of his contemporaries, and had enough of dramatic quality to secure for him a place among the founders of the drama in France. He had also much influence upon the formation of the French language, and his technical knowledge of

music places him as a link between the *déchanteurs* and the early contrapuntists of the Flemish school. His compositions include chansons, motets, and his famous *Robin et Marrian*. See Coussemaker's *Œuvres complètes du trouvère Adam de la Halle* (Paris, 1872), and Ambros's *Geschichte der Musik* (vol. II.).

ADAMAWA, the Mohammedan name of a country in central Africa, visited by Dr. Barth in 1851; in the British sphere of influence; on both sides of the upper Benue; capital, Yola, a city of 12,000 inhabitants. A. is a sub-kingdom, composed of a mixture of pagan tribes conquered by the Foolah chieftain Adama, who subdued the region when it was known as the kingdom of Fumbina. It is a fine country, well watered, generally flat, rising toward the s. to 1,500 ft. or more, with a few groups of mountains, which range from 3,000 to 9,000 ft. in height. It contains good grazing lands and is rich in cattle. Elephants are common; the ayu, an animal resembling a seal, lives in the rivers, feeding at night on the grass of their banks; and there is an indigenous ox, dark gray and less than three feet high. The standard of value is native cotton cloth 2½ in. wide, length indicating price. It is under the protectorate of the Royal Niger Company, which has a station at Yola, but it is governed directly by a native Foolah dynasty, which acknowledges the sway of the sultan of Sokoto.

ADAMITES, a sect of fanatics who spread themselves in Bohemia and Moravia in the 15th and 16th c., but had no connection with the Hussites. One Picard is said to have been the founder of the sect about 1400. He styled himself Adam, the son of God, rejected the sacrament of the supper and the priesthood, and advocated the community of women. After his death, his followers spread themselves in Bohemia under several leaders. They even fortified themselves on an island in a tributary of the Moldau, and committed depredations around. They were detested as much by the followers of Huss as by the Catholics. Ziska (q.v.) made war against them, and slew great numbers; but they were never entirely rooted out. Even as recently as 1849, when the Austrian government declared religious liberty for all its subjects, certain members of this sect appeared and endeavored to gain proselytes. The official investigation into their character which took place at that time represents their creed as a mixture of freethinking, quietism, and communism. The members belong to the peasant or laboring class; and both men and women are generally industrious, temperate, and discreet in their ordinary course of life; but at their nightly meetings, at which they dispense with clothes, the utmost licentiousness is said to prevail.—As early as the 2d c., there was a sect of Gnostic tendency, called *Adamites*, who sought, by abstaining from all indulgence of the senses, to recall the state of innocence men were in before the fall. They therefore rejected marriage, and in order to exercise the virtue of continence went naked. They held that for those who had once attained the state of innocence all actions were alike indifferent—neither good nor evil. This doctrine led directly to the greatest licentiousness. Aberrations of this kind, under various disguises and modifications, have made their appearance from time to time in all ages of the world.

ADAMNAN, SAINT, a member of the early Irish church, to whom the world is deeply indebted for the information about that remarkable community which he left to posterity. His name was properly Adam, of which Adamnan is a diminutive. It is one of the peculiarities of that early church that the genealogies of its eminent members have been preserved with a minuteness scarcely rivaled in the days of peerages. He was born in the co. of Donegal about the year 625. In the words of Dr. Reeves: "His father, Ronan, was sixth in descent from Conall Gulban, the head of one of the two great races of the northern Hy Neill, and in virtue of his birth claimed kin to St. Colomba and many of the sovereigns of Ireland. The father of Ronan was Tinne, from whom came the patronymic *Ua Tinnne*, or grandson of Tinne, an appellation which is occasionally found coupled with A.'s name. Ronnat, the mother of A., was descended from Enna, son of Niall, whose race, the Cincl Enna, possessed themselves of the tract lying between the channels of the Foyle and Swilly, which was called the Tir Enna, or land of Enna, and answers to the modern barony of Raphoe. He was, like many of the eminent Irish clergy, a statesman as well as an ecclesiastic, and we hear of his being sent on missions from his own people to Alfred, king of Northumbria. In the year 679, he was elected abbot of Iona. His rule over that community was not, however, destined to be peaceful and fortunate. The views held by the Irish church about the holding of Easter and the form of the tonsure are now pretty well known as a chapter in the history of the church. However little their own importance might be, they are significant as the object of a bitter contest in which that church resisted the rules promulgated from Rome. In his intercourse with the Saxon church, A. had adopted the Romish or orthodox views, as they are termed, and endeavored to put them in practice in his own community. He was thwarted in this object, and it is said that mortification at the failure caused his death. He d. in the year 704, on the 23d of Sept., which is the day of his translation in the calendar. He left behind him an account of the Holy Land, containing matters which he says were communicated by Arculfus, a French ecclesiastic who had lived in Jerusalem. It is valuable as the earliest information we possess of Palestine in the early ages of Christianity. But far more valuable is his *Vita Sancti Columbae*, his life of St. Colomba, the converter of the Picts, and founder of Iona. Along with miracles and many other stories palpably incredible, this book reveals a great

deal of distinct and minute matter concerning the remarkable body to which both the author and his hero belonged. The standard edition of the book is that of Dr. Reeves, edited in 1857 by the Bannatyne society of Edinburgh, and the Irish archæological society which (with an English trans.) forms the 6th vol. (1875) of *Scottish Historians*. Nearly all the information to be had about the early Scoto-Irish church is comprised in that volume.

ADAM'S APPLE (Lat., *Pomum Adami*). The projection seen nearly midway between the summit of the breast-bone and the base of the chin, in males particularly visible, but rarely observable in females, and then only late in life. The thyroid cartilage, the largest in the larynx, is its source. Its name, "Adam's Apple," is said to take its origin in the superstition that a portion of the apple given to our first parent stuck in his throat, and that the enlargement thus caused has been transmitted to the race. It is produced by the conjunction of the two quadrilateral plates of the larynx causing, by their union, an angle which projects forward.

ADAMS, a co. of w. Illinois, on the Mississippi; 830 sq. m.; pop. '90, 61, 888; drained by Bear and McKee's creeks; the Chicago, Burlington and Quincy and the Wabash, St. Louis and Pacific railroads pass through the co. Co. seat, Quincy.

ADAMS, a co. in e. Indiana, bordering on Ohio; 330 sq. m.; pop. '90, 20,181. It is watered by the Wabash and St. Mary's rivers; mostly wooded; surface level and productive. Co. seat, Decatur.

ADAMS, a co. in s. w. Iowa, on the Nodaway river, and the Burlington and Missouri River railroad; 432 sq. m.; pop. '90, 12,292. It is an agricultural region. Co. seat, Corning.

ADAMS, a co. in s. w. Mississippi, on the M. river: 400 sq. m.; pop. '90, 26,031, with colored. The land is highly productive. Co. seat, Natchez.

ADAMS, a co. in s. Nebraska, bounded n. by the Platte, and drained by the Little Blue river. Area, 552 sq. m. The white population in 1870 was but 19; 1890, 24,303. Co. seat, Hastings.

ADAMS, a co. in s. w. Ohio, on the O. river; 488 sq. m.; pop. '90, 26,098. It is hilly, fertile, and adapted to fruit, timber, and sheep raising. Co. seat, West Union.

ADAMS, a co. in Pennsylvania, on the Maryland border; 535 sq. m.; pop. '90, 33,486. South mountain is on its northern border, and the co. is mostly uneven. Copper mines have been worked with some advantage, and there are marble quarries. Co. seat, Gettysburg, which has railroad communication to the e. and n.

ADAMS, a co. in s. eastern Washington, organized in 1883; 50 m. long, 30 m. wide. The land is well adapted to grazing and farming, and for vegetables and small fruits. Area, 1908 sq. m. Pop. '90, 2098. County seat, Ritzville.

ADAMS, a co. in central Wisconsin, on the W. river: 690 sq. m.; pop. '90, 6889. The surface shows chiefly forest and timber land, with abundant water power. Co. seat, Friendship.

ADAMS, a t. in Berkshire co., Mass., on the Hoosac river and the Pittsfield and North Adams branch of the Boston and Albany railroad; pop. '90, 9213. In the t. is Greylock mountain, 3505 ft., highest in Mass. The w. end of the Hoosac tunnel is 5 miles north at North Adams, which was formerly part of Adams, and is now accessible by an electric road. The chief business is manufacturing cotton goods, paper, lumber, and building materials. There are churches, high and graded public schools, national banks, etc.

ADAMS, CHARLES BAKER; b. Mass., 1814, d. St. Thomas, 1853. He graduated at Amherst and was a naturalist; assisted Prof. Hitchcock in geological survey of N. Y.; became tutor at Amherst, 1836; professor of chemistry and natural history in Middlebury college, Vt., 1838-47; professor at Amherst from 1847 till his death. In 1845-7 he was engaged in the geological survey of Vt. He went several times to the West Indies; wrote on conchology, and with assistance of Prof. Gray, of Brooklyn, published an elementary work on geology.

ADAMS, CHARLES FRANCIS, LL.D., 1807-86; b. Boston; son of John Q. He passed ten years in Europe with his father, and learned Russian, German and French. In 1817 he entered the Boston Latin school; graduated at Harvard college in 1825; studied law with Daniel Webster, and was admitted in 1828, but did not go into practice. In 1829, married a daughter of Peter C. Brooks, and became a brother-in-law of Edward Everett. In 1831 he was sent to State legislature, serving three years in the house and two in the senate. In 1848, candidate for vice-president with ex-Pres. Van Buren on the free-soil ticket. In 1858, elected to congress; supported Lincoln with public addresses, in company with Wm. H. Seward. In 1861, appointed minister to England, and managed American affairs through the crisis of the war with much success. In 1871 he was one of the arbitrators for the U. S. at Geneva. In 1872 he entered with great earnestness into the Liberal Republican movement, and was a formidable rival for the presidential nomination against Horace Greeley who finally received it. In 1876 he was the Democratic candidate for governor of Mass., but was defeated. Mr. A. wrote much for the *North American Review*, the *Christian Examiner*, and the press generally; but his main work was the biography of his grandfather, and editing the writings of both grandfather and father.

ADAMS, CHARLES FRANCIS, jr., b. Boston, May 27, 1835; son of preceding. He graduated from Harvard, 1856, and was admitted to the bar in 1858; served with ability in the civil war, commanding a regiment of colored men, and was mustered out with brevet rank of brig.-gen. Identified with railroad development and arbitration, he became, 1884, president of the Union Pacific railway. He published *Three Episodes in Massachusetts History* (1891).

ADAMS, CHARLES KENDALL, LL.D., b. Vermont, 1835; removed to Iowa, 1855; was graduated at the University of Michigan (1861), and became assistant professor of history in 1863, full professor, 1868. He followed the German method of instruction in history, and in 1869-70 established an historical seminary which proved of great value in promoting the study of history and political science. In 1881 he was made Non-Resident Professor of History at Cornell University, where he succeeded to the presidency on the resignation of President White in 1885. Among his works are, *Democracy and Monarchy in France* (1874); *Manual of Historical Literature* (1882); and *Manual of Historical Literature* (1889). He resigned the presidency of Cornell in 1892; and became President of the Univ. of Wisconsin. He has edited *Johnson's Universal Cyclopædia*.

ADAMS, EDWIN, b. Mass., 1834, d. Philadelphia, 1877; an American actor. He first appeared at the Boston National Theatre, Aug. 29, 1853, as *Stephen* in "The Hunchback;" went through the country, acting *Hamlet*, in 1860; was with Kate Bateman, Henry Placide, and Jas. W. Wallack at N. Y. Winter Garden in 1860; reappeared in N. Y., in 1866, as *Robert Landry* in "The Dead Heart;" was in the company when Booth's Theatre opened, Feb. 3, 1867, and played *Mercutio* and *Enoch Arden* in that house.

ADAMS, HANNAH, b. Mass., 1755, d. 1832; one of the earliest American female writers; author of *Views on Religious Opinions*, 1784; *History of New England*, 1799; *Evidences of Christianity*, 1801; *History of the Jews*, 1812; all of which brought fame, but little money. Hers was the first body buried in Mt. Auburn cemetery.

ADAMS, HENRY, historian, b. in Boston, Mass. 1838; third son of Charles Francis Adams. His chief work, *The History of the United States*, 1801-1817 (9 vols. 1889-91), is a thorough and able treatise highly esteemed by historical scholars. Among his other works are the lives of Albert Gallatin and John Randolph, historical essays and a collection of *Documents relating to New England Federalism*, 1800-1815 (1877).

ADAMS, HENRY CARTER; economist, b. in Davenport, Ia., in 1852. He was professor in the University of Michigan, statistician to the Interstate Commerce Commission and special agent of the 11th census, in charge of the department of transportation. His publications, besides the annual reports of the Interstate Commerce Commission (1889-91), include an *Outline of Lectures on Political Economy* (1881-86); *Taxation in the United States 1789-1816* (1884) *Public Debts and Relation of the States to Industrial Action* (1887); *Relation of American Municipalities to Quasi-Public Works*, and *Philanthropical and Social Progress* (1893).

ADAMS, HERBERT BAXTER, historian, b. 1850, associate professor in John Hopkins University in 1883 and university professor in 1891. He has been active in the work of university extension, has edited the valuable series of *Studies in Historical and Political Science* of Johns Hopkins University, and written among other works *Maryland's Influence in founding a National Commonwealth*, and *Thomas Jefferson and the University of Virginia*.

ADAMS, JOHN, the second president of the United States, was born, Oct. 19, 1735, in Braintree, Mass., in that part of the town now forming the town of Quincy. He was the great-grandson of Henry Adams, a Puritan, who emigrated from England to Massachusetts about 1640. His father was a deacon of the church and selectman, a farmer of small means and a shoemaker, but he gave John a good education at Harvard, whence he went to Worcester and took charge of a school. He was ambitious, and only lacked influence to get into the army; then he thought of divinity, but the confusion and wrangling of sects dismayed him, so he settled on law. In 1764 he married Abigail Smith, daughter of the minister at Weymouth, and a person above his social position. She proved a good wife and mother and made his home happy. Soon after marriage he went into politics with other opponents of the stamp act and parliamentary oppression. He was selected as one of the counsel of the town of Boston, the others being Jeremiah Gridley, the head of the bar, and James Otis, the famous orator. They were to present to the governor and council a memorial asking that courts might proceed with business though no stamped paper was to be had. As junior, Adams opened the business, taking the bold stand that the stamp act was void because parliament had no right to tax the colonies. The repeal of the act soon after ended the matter. About this time he began to write on "Taxation" in the *Boston Gazette*, and some of his articles were reprinted in a London paper. In 1768 he moved to Boston, and two years later was elected to the general court, though at the time he was retained to defend Capt. Preston in the Boston massacre affair, who was acquitted in spite of the great prejudice existing. In the general court he began to be a leader of the patriot party, and though he soon resigned was consulted upon all important matters by Governor Hutchinson. About this time he wrote articles on the independence of the judiciary and the payment of the salaries of judges by the crown. The destruction of the tea brought on the crisis and produced the congress of 1774, of which

A. was one of the five Massachusetts members. There he took active part in the discussion of colonial independence, and when a declaration was agreed upon he was chosen to put the resolutions in shape. Returning home he was chosen to the provincial congress, then in session, which had substantially declared war by appointing a committee of safety, seizing the provincial revenues, appointing general officers, collecting stores and beginning to form an army. After the adjournment of this congress his pen was again at work and the "Novanglus" articles appeared in answer to pro-British papers signed "Massachusettsensis." This work was interrupted by the battle of Lexington, and A. hurried to the congress in Philadelphia, which body soon became the chief authority in the colonies. Adams was satisfied that reconciliation was impossible, though a majority in congress thought differently. The siege of Boston had begun, and Adams claims that he first suggested Washington for the chief command in order to secure the active help of the Virginia delegates; but he insisted that Gen. Artemus Ward should be second, which place the Virginians wanted for Lee; Lee was made third in rank. While absent from congress some of his correspondence was made public, in which he spoke very freely of his colleagues, especially John Dickinson, who, with some others, became his personal enemy for life. He was a hard worker in congress, chiefly in committees; was on the naval committee, and his rules then written are the basis of our present naval code. Late in 1775 he was appointed chief justice of Mass., but never took the seat, resigning the next year. In congress freedom was slowly gaining ground; A. was in favor of the adoption of self-government by each of the colonies, then a confederation, and then treaties with foreign powers. May 13, 1776, he carried the first proposition, and the others naturally followed. A resolution by Robt. H. Lee offered under instructions of the Virginia convention, that the "colonies are by right and ought to be free and independent," was warmly supported by A. and carried by seven states to six. A. was put on the committee on the declaration and on foreign affairs, and was chairman of the congressional board of war, in fact the war department, where he gave the hardest labor for 18 months, and almost alone created such a war department as we had; and in this and other work he gained the reputation of "the clearest head and firmest heart of any man in congress." Near the close of 1777 he was appointed commissioner to France to supersede Silas Deane. The French alliance was already made, and Franklin commissioned as ambassador. A. came home in 1779 in the ship with our first minister from a foreign power. He was made a member of the Mass. constitutional convention, but was immediately appointed minister to Great Britain to treat for peace, and returned to Europe in the same frigate that had brought him home. Soon after arrival in London he went to Holland to negotiate a loan, and was made minister to that country while there. He secured a loan of \$2,000,000. After peace, with which he had much to do, he was sent as minister to England, and arrived in London in May, 1785. He was civilly but coldly received, and his situation was anything but agreeable; so, at his request, he was recalled in 1788. While in England he prepared his *Defense of the American Constitution*, a work which subjected him to the charge of anti-republican and even monarchical tendencies. Under the newly organized federal government he became vice-president, and gave probably more casting votes in the senate than all vice-presidents since, giving about twenty, nearly all to support Washington's policy or on some important organic law. Up to this time A. and Jefferson had generally agreed, but differing views of the French revolution separated them widely—A. vehemently denouncing that outbreak as a great evil. The strife became so warm that when the second presidential election came on, the friends of Jefferson nominated George Clinton for vice-president against A., but failed to defeat him. With Washington, A. heartily supported the plan of neutrality, while the Jeffersonians were eager for discriminations against England. Washington declined a candidacy for a third term, and then came our first partisan contest for president; Adams, Hamilton, Jay, Jefferson, and Thomas Pinckney were more or less in the field. In the electoral college A. barely prevailed, having 71 votes to 68 for Jefferson; (as the law was then the electors voted for two men without designating the office, the highest vote made the president, and the next highest the vice-president). A. charged Hamilton with dividing the vote of the north and east, and that, with other contemporaneous troubles, broke up the federal party. Our French relations were in a critical state when A. took the chair; our minister, James Monroe, had disregarded his instructions and led us into difficulty with the wily Talleyrand, and the exposure of this entanglement aroused a strong anti-French feeling and revived the old federal party; but some unlucky appointments by A., such as Vans Murray for minister to France, soon checked this resurrection. When the new commission reached France, Bonaparte was in power, and there was no further difficulty. When the election of 1800 came on, the federal party was only in fragments; the republicans (soon to be democrats) were strong and growing rapidly under such skillful leaders as Jefferson and Burr. A. was still popular with the people, but his opponents loaded him down with the French troubles, the alien and sedition laws, and many sins of which he was not guilty; his private correspondence was exposed, and to all, as in Washington's case, was added the charge that he selected his cabinet under British influence. There was no choice of president by the people's election: Jefferson had 73 votes, Burr 73, Adams 65, Pinckney 64. After many ballots the house of representatives chose Jefferson for president and Burr for vice-president, and on the day of inauguration John Adams left office without waiting to see

his opponent take the chair. He had no intercourse with his successful rival for thirteen years. A. at once quitted public life; he had been frugal and was not without estate, and his home was happy, until the death of his second son; his hope, however, was in his son John Quincy, whom he desired to see seated in the presidential chair. Few men have fallen so suddenly from high political importance to zero; in the last year of his term he received and wrote letters by thousands; the next year he received hardly a hundred. He lost the favor and got the spite of both parties. He was bitterly assailed long after he left office, and his misdeeds were even used in the campaign against his son in 1824. But though his official utterances were stopped, his pen was busy. He defended himself in the newspapers, and brought to light many important historical facts. After Jefferson left public life he and A. were reconciled and corresponded during the remainder of their lives, both dying on the same day, the day of all in which they might desire to go—July 4, 1826, the semi-centennial anniversary of the declaration of independence in which both had taken deep personal interest. When A. was in his 86th year he was chosen a delegate to the convention to revise the Mass. constitution, and did much to bring about a modification of sections respecting religion and support of churches, for with years he had grown liberal, even ahead of his time. In person he was above medium height, with a stout, well-knit frame, growing corpulent with age; large head, wide and expansive brow; a mild and even humorous eye; general aspect grave and imposing; he delighted in society and conversation and was a good talker; affections warm but not particularly demonstrative; anger violent and soon cooled, and without malevolence; impatient of cant and of opposition to his well-established views.

ADAMS, JOHN, the assumed name of Alexander Smith, one of the mutineers of the English ship "Bounty," b. London, 1760 (?), d. Pitcairn Island, Mar. 29, 1829. Nine months after the mutiny A. and his sailors, with some men and women from Tahiti, landed on Pitcairn Island and formed a government, of which he was the head. In 1800 he was the only surviving Englishman. He established worship and such a school as was possible. In 1808, Capt. Folger, an American, landed there and brought the world the first news of this strange settlement. A. had not heard a word from civilized countries in 20 years. England never sought to punish him, and he died in peace, leaving a prosperous and religious people. See PITCAIRN ISLAND.

ADAMS, JOHN, LL.D., 1772-1863; teacher and philosopher. He graduated at Yale 1795; was principal of two or three academies; went to Ill., where he introduced valuable modifications in school laws, and organized many Sunday-schools. He wrote on educating and training the young.

ADAMS, JOHN COUCH, discoverer, simultaneously with Le Verrier, of the planet Neptune, was born near Launceston in Cornwall, 1819. He early manifested an aptitude for mathematics; and after the usual amount of school-training, he was sent to St. John's college, Cambridge, where he attained the honor of senior wrangler, and became a mathematical tutor. In 1841, he undertook to find out the cause of the irregularities in the motion of Uranus, anticipating, indeed, his own and Le Verrier's discovery—namely, that they are due to the influence of an unknown planet. Le Verrier did not commence his researches till the summer of 1845; but on the 10th Nov. published the results of his calculations, demonstrating the existence of an unknown planet, declaring it to be the cause of the known disturbance, and assigning to it almost the same place as A. had done in a paper which he left with the astronomer royal at Greenwich observatory in the previous Oct., but which he neglected to publish. Le Verrier has thus acquired, naturally, the whole honor of the discovery; but the merit of A. is not less. The researches of the latter commenced earlier; his discovery, too, was earlier; and it was only unfortunate for the reputation of the young astronomer that he omitted to publish the results he had obtained. The council of the royal astronomical society showed that they appreciated the value of A.'s labors, by awarding equal honors to both. In 1858, A. was appointed to the chair of mathematics in St. Andrews, which, however, he vacated within a few months, on being nominated to the professorship of astronomy, Cambridge. He died in 1892.

ADAMS, JOHN QUINCY, the sixth president of the U. S. of North America, and son of the second president, was born in Mass., July 11, 1767. In his boyhood he accompanied his father on an embassy to Europe, and passed a considerable part of his youth in Paris, at the Hague, and lastly in London. Under the advantages secured while with his father abroad, John Quincy became one of the best educated men of his time. He graduated from Harvard in 1788, and studied law with Theophilus Parsons three years; was admitted to the bar in 1791, and mixed law practice with writing for the newspapers, especially discussing French neutrality and Tom Paine's *Rights of Man*. In 1794 Washington appointed him minister at the Hague; in 1797 he married the daughter of Joshua Johnson, formerly a merchant at Nantes. On Washington's written advice, president Adams appointed him minister to Berlin, where he learned German and translated Wieland's *Oberon*, but did not publish it, because Sotheby's translation just then appeared. Jefferson recalled him, and in 1802 he was a member of the Mass. legislature. When only 36 years of age he was elected senator in congress, but soon afterwards resigned. In 1806 he was professor of rhetoric and belles-lettres in Harvard. About this time may be noted the first appearance of the sectional ideas which culminated in the late civil war of 1861-5. During a visit to Washington, A. had a conference

with Jefferson in which he charged a portion of the federal leaders with a design of dissolving the union and establishing a separate northern confederacy. This charge was often repeated, and for a dozen years it seriously affected the administration of the government, reducing the statesmen of New England to a position of much less weight and influence in public affairs than they were entitled to or had enjoyed, and very probably restricting Mr. A. to his one term of the presidency. This idea was said to have originated with certain federal members of congress because of the acquisition of Louisiana, and the threatened destruction, by additions of southern and southwestern territory, of the political influence of the n. and e. A. said that these members of congress were to have a meeting in Boston, at which Alex. Hamilton would be present, though he did not approve of their ideas. In 1809 Madison sent A. as minister to Russia, and during his residence there he was made associate justice of the U. S. supreme court, but declined the honor. In Russia he had much influence, inducing the emperor to offer himself as mediator between our country and Great Britain. In 1813 he was, with Henry Clay, Albert Gallatin, and Jonathan Russell, a commissioner to negotiate peace with Great Britain, which was effected at Ghent after six months' work, and signed Dec. 24, 1814. The next spring A. was made minister to England, and was there until Monroe called him home to be secretary of state, in which position he had important work in defending Gen. Jackson's conduct in Fla. against Spain, in the Miranda expedition, and in the question of the La. boundary, in which the Sabine river was accepted as a compromise. Near the end of Monroe's first term the strife between slavery and freedom began on the occasion of the bill admitting Missouri, sent to Monroe for his signature. He submitted two questions to his cabinet: 1. Has congress constitutional power to prohibit slavery in a territory? 2. Was the term "forever" in the prohibitive clause forever absolutely, or only during the territorial condition of the country specified? On the first question all the cabinet voted yea; on the second A. thought "forever" covered state as well as territorial condition, but all the others held the other view. To harmonize matters, Calhoun suggested the broader question, "Is the proviso as it stands in the bill constitutional?" And on this all voted yea. In 1824, Adams, Jackson, Crawford, and Clay, all democrats, were candidates for president. In the college the vote was 99 for Jackson, 84 for Adams, 41 for Crawford, and 37 for Clay. In the house A. was chosen, as it was charged, by the influence of Clay, whom he made secretary of state. As soon as A. was in office all the other factions of the democracy united against him and in favor of Jackson; both houses of congress were against him for the latter part of his term, and he was assailed with the most unscrupulous and vindictive bitterness. For his second term he got only 83 votes to 178 for Jackson. He retired to Quincy, but not to idleness. A long political life had closed; a shorter and more important one was about to open. A new party, the anti-masons, sent him to congress, and his district kept him there for seventeen years, during which he was almost ever at his post and always at work. In 1834 he was a candidate for governor of Mass., but was defeated by John Davis, who not long after beat him for U. S. senator. Free from all parties and cliques, A. became the people's champion, especially as to the right of petition, which the southern congressmen were ever anxious to restrict. Everybody soon knew that though he might oppose the purpose sought, A. would promptly present any respectful petition. This was fully tested in 1837, when he astonished everybody by presenting a petition from actual slaves; and compelled its reception, notwithstanding the uproar which it created. By degrees he gravitated towards the abolitionists. Though not identified as one of them, he was always the champion of the right of petition. He secured the repeal of the notorious gag rule; he defended the slave mutineers of the *Amistad*, and was ready, anywhere and everywhere, to stand up for free speech. On the 26th Nov., 1846, when leaving Boston to take his seat in congress, he had an attack of paralysis, and was kept away four months; after that he was at his post, but seldom spoke. On the 21st of Feb., 1848, came a second attack, while he was in his seat in the house; he was taken to the speaker's private room, and d. on the second day after, his last intelligible words being, "This is the last of earth; I am content." Like his father, he was a Unitarian in his religious views, though not extreme; also, like his father, he kept voluminous diaries and journals. See *Memoirs of A.* edited by Charles F. A. (12 vols.); also Morse's *Life of A.* (Boston, 1882).

ADAMS, JOHN QUINCY, 2d, b. Boston, 1833; son of Charles Francis; graduate of Harvard. He was admitted to the bar in 1855; was on Gov. Andrew's staff in the civil war; in 1866 a representative in the legislature; in 1867 democratic candidate for governor, and defeated. In 1869-70 he was in the legislature; in 1871 he was an unsuccessful candidate for governor and representative. In 1872 was nominated for vice-president with Chas. O'Connor for president, by democrats who would not support Horace Greeley; but O'Connor peremptorily refused, and A. would not stand without him. He made many able and elaborate speeches. He died Aug. 14, 1894.

ADAMS, NEHEMIAH, D.D., 1806-78; a graduate of Harvard, and student of divinity at Andover. In 1829 he was settled over the First Congregational church in Cambridge, and in 1834 over the Union Congregational church in Essex st., Boston; author of *Remarks on the Unitarian Belief*, *The Friends of Christ in the New Testament*, *Life of John Eliot*, *Christ as a Friend*, and other religious books. After a winter in Georgia for the benefit of his health, where he lived with a rich planter, he wrote *A South-side View of Slavery*, praising its effect upon the religious character of the negroes. The work brought

upon him severe animadversion. In 1869-70 he made a voyage around the world. As a writer he was greatly admired for the finish and delicacy of his style.

ADAMS, SAMUEL, one of the leading men of the American revolution, was born at Boston, Mass., Sept. 27, 1722, belonged to a wealthy family, and, like John Adams, second president of the United States, was descended from Henry Adams, a Puritan emigrant. He fitted for college at the Boston Latin school, and entered Harvard in 1736. His father, Captain Samuel Adams, hoped that he would enter the Congregational ministry, but the young student had no such inclinations, and on leaving college in 1740 entered a law-office. The law proving distasteful, Adams next entered a counting-house, where his industry was greater than his business ability and soon became a merchant himself, but failed. Subsequently he became a partner with his father in a brewery, and failed after the latter's death. When a candidate for the degree of A.M. at Harvard college, he had maintained in his thesis the affirmative of the question: Whether it be lawful to resist the supreme magistrate, if the commonwealth cannot be otherwise preserved?

A taste for politics was gratified about 1750 by his appointment as tax-collector of Boston. When the paper money question became prominent in the colony he was conspicuous, and soon became an advocate for the people against parliamentary authority. Through him, under instructions of the town of Boston, was heard, in May, 1764, the first protest from America against lord Grenville's plan for taxing the colonies.

The patriotic party sent him as a representative to the general court, and during his nine years of service he acted as clerk, and drew up most of the papers. He is thus described in John Adams's diary: "Adams is zealous, ardent, and keen in the cause; is always for softness, delicacy, and prudence, when they will do; but is stanch and stiff and strict and rigid and inflexible in the cause." While he was engaged in politics his wife (Elizabeth Checkley) supported the family. She died in 1757, and in 1764 he married Elizabeth Wells. He was spokesman of a committee to demand the removal of the troops after the Boston massacre, and by his boldness effected the purpose. Adams was a member of the first congress, and at first was conciliatory; yet he signed the declaration of independence, and no one did more to effect the separation from England, as General Gage testified, when he excepted only "John Hancock and Sam Adams" from an offer of pardon.

Adams did not like the federal constitution, but Hancock persuaded him to support it in the Massachusetts convention, though he proposed several amendments, some of which were adopted. He took an active part in framing the constitution of Massachusetts, and was for several years president of the senate of that state. He held the office of its lieutenant-governor from 1789 to 1794, and of governor from that time till 1797. He then retired from public life, and died at Boston, Oct. 2, 1802, poor as he had lived. A's character was one of great courage and determination. He was conservative in religion, being a strict Calvinist, yet without bigotry. In political matters he was, at times, narrow-minded. He was prejudiced against Washington, whose conduct of the war and his ignorance of military matters led him to think weak and dilatory; and the confidence reposed in Washington, as first president of the republic, seemed to Adams to savor of aristocracy. In home politics he inclined toward Jeffersonian views, and the French revolution was warmly approved by him. He is described as of usual size, muscular, with light blue eyes, fair complexion, erect and dignified, wearing a tie wig, cocked hat, and red cloak. He was poor till near the end of his life, when by the death of his son, a surgeon in the revolution, he received enough to live upon. He was the author of many state papers and political newspaper articles; but an oration said to have been spoken by him in Philadelphia, Aug. 1, 1776, and printed in London, is reckoned spurious. In this oration the English are called "a nation of shopkeepers," an epithet which was quickly adopted by the first Napoleon. Adams left only a daughter, and none of his blood now bear the name. See Wells's *Life and Public Services of Samuel A.* (1865).

ADAMS, THOMAS, an English preacher in the early part of the 17th c., called by Southey "the prose Shakespeare of Puritan theologians." He was minister at Wiltington, Wingrave, and London, and "observant chaplain" to Sir Henry Montague, the lord chief justice. He wrote *Heaven and Earth Reconciled*, *The Devil's Banquet*, and other works, and a great number of his sermons were printed. A. was a Puritan within the church of England, as distinguished from the non-conformist Puritans who left the church. Jeremy Taylor did not surpass him in brilliance of fancies, nor Thomas Fuller in wit.

ADAMS, WILLIAM, D.D., b. Conn., 1807; son of John, LL.D. He graduated from Yale in 1827; studied theology at Andover and was ordained a Congregational minister. In 1834 he left his parish in Brighton, Mass., and took charge of the Central (now Madison square) Presbyterian church, in N. Y., where he continued more than forty years. Dr. Adams, renowned as a pulpit orator, was greatly prominent in many works of charity and usefulness. He was moderator of the general assembly of 1852, and took an active part in securing union between the old and new school parties in his church. Dr. A. published several sermons, addresses, and other works. He was elected pro-

fessor of sacred rhetoric and pastoral theology in the N. Y. University, but declined the position. Having resigned his pastorate in 1873, he became the President of the Union Theological Seminary (Presbyterian) in the city of N. Y. He d. 1880.

ADAMS, WILLIAM DAVENPORT, b. Brixton, Surrey, Eng., abt. 1850; son of W. H. D. A.; is well known as a journalist and as the editor of the *Dictionary of English Literature* (1877), and of several collections of poetry.

ADAMS, WILLIAM HENRY DAVENPORT, b. 1829; an English littérateur; began his life as a journalist, but of late years has almost wholly devoted himself to book-making. He has translated or adapted many works from the French of Figuier, Mangin, and Michelet, and compiled, written, or edited over a hundred volumes.

ADAMS, WILLIAM T. (Oliver Optic), b. Mass., 1822; a writer of works for the young; editor of *Oliver Optic's Magazine for Boys and Girls*, and also a magazine and general writer. He d. 1897.

ADAM'S BRIDGE, a chain of shoals extending across the gulf of Manaar, between Ceylon and the peninsula of Hindustan. It forms a great obstruction to vessels proceeding through the channel.

ADAMSON, PATRICK, a Scottish prelate, and one of the most learned writers of his time; was born in Perth in 1543. He was graduated from the University of St. Andrews, and went abroad as tutor in 1566. On the birth of James, son of Mary Queen of Scots, he wrote a Latin poem, in which he spoke of the young prince as king of France and England. This so offended the French court that he was arrested and imprisoned for six months, and was only released on the intercession of Queen Mary and some of the principal nobility. After his release he returned to his duties as tutor, and narrowly escaped death shortly after, during the massacre of Paris. He lived in concealment for seven months, during which time he wrote a poetical version of the Book of Job, and the tragedy of Herod, both in Latin. In 1573 he returned to Scotland and became minister at Paisley. On the death of Archbishop Douglas he was appointed Archbishop of St. Andrews, which brought him into continual trouble and discredit, and finally to great poverty and affliction. He died in 1592.

ADAM'S PEAK, the name given by Mohammedans, and after them by Europeans, to a mountain summit in the s. of Ceylon 7420 ft. high (not, however, the highest of the group). The native name is Samanahela. The cone forming the summit is a naked mass of granite, terminating in a narrow platform, in the middle of which is a hollow, 5 ft. long, having a rude resemblance to a human footstep. Mohammedan tradition makes this the scene of Adam's penitence, after his expulsion from paradise; he stood 1000 years on one foot, and hence the mark. To the Buddhists, the impression is the *ari-pada*, or sacred footmark, left by Buddha on his departure from Ceylon; while the Hindus claim it as the footprint of their god Siva. Over the sacred spot stands a wooden canopy, and multitudes of devotees, Buddhist, Hindu, and Mohammedan, frequent it.

ADAN'A, a Turkish vilayet or province in the s.e. of Asia Minor, derives its name from its chief city Adana, containing 45,000 inhabitants. The city is distant almost 30 m. from Tarsus, on the way to Aleppo, commands the pass of the Taurus mountains, and carries on a considerable trade between Syria and Asia Minor. Pompey peopled the territory of Adana with pirates. The Syrian kings made the place a city, under the name of *Antiochia ad Sarum*, and on the ruins of Antiochia the caliph Haroun er Rashid built Adana. The present inhabitants are mostly Turks, mixed with some Greeks and Armenians.

AD'ANSON, MICHEL, a celebrated French botanist, b. at Aix, April 7, 1727. He soon left the clerical profession, for which he was educated, and devoted himself to the study of natural history. In his early career he entertained the ambition of superseding the Linnæan system by a clearer and more comprehensive method of arrangement. When about twenty-one years old he went to Senegal in Africa, and, fearless of the unwholesome climate, stayed there five years, afterwards returning to France with a large collection of specimens in natural history. Soon after his return, he laid before the French East India company his plan of a colony on the African coast, in which all colonial produce was to be raised without slave-labor. But his plan was neglected. He published, in 1757, his *Histoire Naturelle du Sénégal*, and, in 1763, his *Familles des Plantes*, in which he endeavored to give a new form to botany; but he could not prevail against the established Linnæan system. His next undertaking was one on a vast scale—nothing less than a complete encyclopædia, for which he hoped to gain the patronage of Louis XV. and the Academy; but though his bold plan was regarded with admiration, he received little substantial encouragement. This, however, did not check his enthusiasm; he proceeded with the work until he exhausted his means. During the revolution he fell into very indigent circumstances. When invited to become a member of the National Institute, he answered that he was unable to attend for want of a pair of shoes. Afterwards he received a pension, and until the time of his death, Aug. 3, 1806, he was earnestly devoted to the prosecution of his plan, too vast to be carried out by an individual.

ADANSO NIA, a genus of the natural order *sterculiaceæ* (q.v.), sub-order *bombacææ*, named by Linnæus in honor of the botanist Adanson (q.v.), and distinguished by a

simple deciduous calyx, a very long style, with numerous stigmas and a woody capsule containing a farinaceous pulp. The only known species, *A. digitata*, the *baobab*, also called the monkey-bread tree, is a native of the tropical parts of w. Africa, but now introduced into the e. and w. Indies. It is the largest known tree—not indeed rising to a very great height, but exceeding all other trees in the thickness of its trunk (20 to 30 ft.). Even its branches (60 to 70 ft. long) are often as thick as the stems of large trees, and they form a hemispherical head of 120 to 150 ft. in diameter; their outermost boughs drooping to the ground. The leaves are digitate or 7-fid; the flowers are white and extremely large, on drooping peduncles of a yard in length. The fruit (*monkey-bread*) is of the size of a citron. The bruised leaves (*lalo*) are mixed with the daily food of the inhabitants of tropical Africa; and Europeans in that country employ them as a remedy for diarrhea, fevers and diseases of the urinary organs. The pulp of the fruit, which is slightly acid and pleasant to the taste, is eaten with or without sugar; and the expressed juice mixed with sugar is much esteemed as a beverage, being very refreshing, effectual in quenching thirst, and regarded as a specific in putrid and pestilential fevers. The bark is said to be powerfully febrifugal.

ADAPTATION, in biology, is the process by which an organism becomes modified to suit the conditions of its life. Every change in a living organism involves A.; for in all cases life develops itself in a continuous adjustment of internal to external relations. But the term usually implies such modifications as arise during the life of an individual, when an external change directly induces some change of function and structure. All A. is limited, since an organism can vary from its congenital structure only to a certain limited extent.

A'DAR, the twelfth month of the ecclesiastical and the sixth month of the civil Jewish year; according to the rabbins, from the new moon of Feb. to the new moon of March. On the 7th of A. comes the fast for the death of Moses; the 13th is called the fast of Esther, and by common usage is a festival in memory of the death of Nicanor. On the 14th and 15th occurs the important feast of Purim.

ADDA, the Latin *Addua*, a river of Lombardy, rising in the Rætian Alps above Bormio. It flows into the lake of Como; issuing from which below Lecco, it traverses the plain of Lombardy in a direction s.s.e., passing Lodi and Pizzighetone, and falls into the Po about 8 m. above Cremona. It formerly bounded the republic of Venice and the duchy of Milan.

AD'DAX. See ANTELOPE.

ADDER, a common English name of the viper (q.v.), but also often more vaguely used for poisonous serpents of the family *viperidae*. Where the name occurs in the authorized version of the scriptures, it appears to be always in this vague sense; although the terms in the same places of the original may probably be more precise. A very venomous serpent of New South Wales (*acanthopsis tortor*) is sometimes called the *death* or *black adder*. See *illus.*, ANTELOPES, ETC., vol. I.

ADDINGTON, a co. in the province of Ontario, Canada, near the e. end of lake Ontario; 2000 sq. m.; pop. '91, 24,151. It is drained by the Napanee river and has several small lakes. Principal industries are lumbering, wool-growing and dairying. Chief town, Napanee.

ADDINGTON, HENRY (lord Sidmouth), 1757-1844; son of Dr. Addington, who was physician to the earl of Chatham, by reason of which the son became playmate and friend of the younger Pitt, who induced him to enter parliament in 1784. In 1789 he was elected speaker of the commons. When Pitt resigned he took the place of chancellor of the exchequer and formed a new ministry, but met so much opposition that he resigned in 1804, whereupon the king made him viscount Sidmouth. He was home secretary in 1812, and retired in 1824.

ADDISCOMBE. See CADET.

ADDISON, a co. in Vermont, on lake Champlain, drained by Otter creek and intersected by the Central Vermont railroad; 734 sq.m.; pop. '90, 22,277. The w. part is flat, and the e. mountainous: the soil is fertile, and there are manufactures of cotton, wool and paper, and marble quarries. Co. seat, Middlebury.

ADDISON, JOSEPH, the son of an eminent clergyman of the church of England, was b. at Milston, near Amesbury, in Wiltshire, on the 1st May, 1672. After a preliminary education at various schools, he entered the university of Oxford when only fifteen years of age, where he greatly distinguished himself, especially by the facility with which he wrote Latin verse. He was originally intended for the church, but various circumstances conspired to draw him aside into literature and politics; the principal of which were his acquaintance with Dryden, who honored the young poet with his patronage, and his intimacy with lord Somers, whose favor he gained by dedicating a poem to him on one of king William's campaigns. In 1699 he received a pension of £300 a year, and then set out on a continental tour. While in France he perfected himself in the language of the country. On the outbreak of the Spanish war of succession he departed to Italy, where he penned his charming *Letter* to lord Halifax. Towards the end of 1703, he returned home by way of Switzerland and Germany; but his expectations of a

"place" were disappointed, for the whigs were out of office. The battle of Blenheim, however, which occurred in the next year, presented a brilliant opportunity to him, which he did not fail to make the most of. The ministry wished the victory commemorated in verse, and A. was appointed to do it. Lord Godolphin, the treasurer, was so excessively delighted with the first half of the triumphal poem, that before the rest was finished he made A. a commissioner of appeals. The poet was now fairly involved in politics. He accompanied Halifax to Hanover, became under-secretary of state in 1706, and in 1709 went to Ireland in the capacity of secretary to the lord-lieutenant, where he also obtained the office of keeper of the records, worth £300 a year. In the same year his friend Steele commenced *The Tatler*, to which A. soon became a frequent contributor. He also wrote a number of political articles in the *Whig Examiner*. On the 1st of Mar. 1711, appeared *The Spectator*, the most popular and elegant miscellany in English literature. With an interruption from 6th Dec., 1712, to 15th June, 1714, during part of which time *The Guardian*, a similar periodical, took its place, *The Spectator* was continued to 20th Dec., 1714. A.'s fame is inseparably associated with this periodical. The quality of his genius is now determined by it rather than by the artificial rhetoric of his *Cato*. He was the animating spirit of the magazine, and by far the most exquisite essays which appeared in it are by him. In 1713 appeared *The Tragedy of Cato*, the popularity of which, considering its total want of dramatic power, was amazing. It was generally understood to have a political as well as a poetical inspiration; but so prudently had A. expressed himself, that both parties, whig and tory, received its frigid declamation with rapture. It was translated into various European languages; and even the monarch of French criticism, Voltaire, held Shakespeare a barbarian in tragedy compared with our author. "All the laurels of Europe," says Thackeray, "were scarcely sufficient for the author of this 'prodigious' poem." Every one in England praised it except Dennis. A. was called the "great Mr. A." after that wonderful night in the theater, when, as Pope says, "the numerous and violent claps of the whig party on the one side were echoed back by the Tories on the other." This enthusiasm was a delusion which time has effectually dispelled. In 1716, A. married the dowager-countess of Warwick, and in the following year was appointed secretary of state. For neither of his new situations was he at all suited. Lady Mary Wortley Montagu, in a letter to Pope, expressed her fear that "a day might come when he would be heartily glad to resign both." He was so extremely timid and awkward in large companies that it was out of the question for him to attempt debating in parliament—a thing indispensable to one in his position. He consequently resigned in 1718. Then as to the other matter, Dr. Johnson sarcastically remarks that "the lady was persuaded to marry him on terms much like those on which a Turkish princess is espoused—to whom the sultan is reported to pronounce: 'Daughter, I give thee this man for thy slave.'" No one can doubt that this marriage was a mistake on the part of A. His health had been for some time in a very precarious state; and at length, after an illness of a few months, he died at Holland House, Kensington, on the 17th June, 1719, in the 48th year of his age, three years after what Thackeray calls "his splendid but dismal union." A. had appointed Mr. Tickell his literary executor, who published his works shortly after in 4 vols. quarto. Besides those to which we have incidentally alluded, he wrote *A Treatise on the Usefulness of Ancient Medals, Especially in Relation to the Latin and Greek Poets*, which, however, excited little interest. He also left an unfinished work on *The Evidences of the Christian Religion*. But the most delightful and original of all his productions is that series of sketches in *The Spectator* of which Sir Roger de Coverley is the central figure, and Sir Andrew Freeport and Will Honeycomb the side ones. Sir Roger himself is an absolute creation; the gentle yet vivid imagination, the gay and cheerful spirit of humor, the keen, shrewd observation, and fine raillery of foibles which A. has displayed in this felicitous characterization, render it a work of pure genius. But A. in prose is always excellent. He has given a delicacy to English sentiment and a modesty to English wit which it never knew before. Elegance, which in his predecessors had been the companion of immorality, now appeared as the advocate of virtue. Every grace was enlisted in the cause of a benign and beautiful piety. His style, too, is perfect after its fashion. There are many nobler and grander forms of expression in English literature than A.'s, but there are none comparable to it in sweetness, propriety and natural dignity. "Whoever wishes," says Dr. Johnson, "to attain an English style, familiar but not coarse, and elegant but not ostentatious, must give his days and nights to the volumes of A." His various writings, but especially his essays, fully realized the purpose which he constantly had in view, "to enliven morality with wit, and to temper wit with morality." They materially helped to reform the manners of their time, and created, in addition, that class of readers, which has now become so prodigious in numbers, and on which all literature now depends for its support—the middle class. It must, however, be admitted that since the beginning of the present c. their popularity has undergone a considerable decline. The chief cause of this is that much in them relates to temporary fashions, vices, rudenesses and absurdities which are now out of date. Yet, after making every abatement, it is certain that there are in the collected works of A. so many admirably written essays on subjects of abiding interest and importance, on characters, virtues, vices and manners, which will checker society while the human race endures, that a judicious selection can never fail to present indescribable charms to the man of taste, piety, philanthropy and refinement.

ADDRESS, FORMS OF. See FORMS OF ADDRESS.

ADELAAR, CORD SIVERTSEN, one of the greatest naval commanders of the 17th c., was b. at Brevig, in Norway, in 1622, and in his 20th year was employed in the naval service of Venice against the Turks. On one occasion he broke through a line of 67 Turkish galleys which surrounded his ship, sunk 15, and burned several others. Frederick III., by the offer of the then unheard-of salary of \$7200 per annum, engaged him as admiral of the Danish fleet; and, in 1675, under Christian V., he took the command of the whole of the Danish naval force against Sweden, but died suddenly at Copenhagen before the expedition set out.

ADELAIDE, the capital of the colony of South Australia, is situated on the Torrens, 7 m. from Port Adelaide, with which it is connected by railway. The first settlement was made in 1836, and the survey of the town lands was completed in 1837. The Torrens, which is spanned by several bridges, divides the town into North and South Adelaide. The streets of A. are broad and regularly laid out, especially in A. proper, to the s. of the river, where they all cross each other at right angles. Among the public buildings are the post-office, the government offices, the governor's house, and the town-hall. It is the seat of an Episcopal and of a Roman Catholic bishop, and has an unusual number of churches; a university, three colleges, and a botanical garden, covering 120 acres of ground. The t. is surrounded by a belt of permanently reserved land, half a mile in width, called the *park lands*, and beyond this are the suburbs. A. is abundantly supplied with water from two reservoirs 6 or 7 m. distant. The chief manufactures are woolen, leather, iron and earthenware goods. Its port (Port Adelaide) has a safe and commodious harbor. Pop. 1894, about 140,000.

ADELAIDE, EUGÉNIE LOUISE, 1777-1847; princess of Orleans and sister of Louis Philippe. During the revolution she was in England, and on her return in 1792 found herself proscribed as an *émigrée*. She went to the Netherlands for the protection of her brother, but he was compelled to flee. In 1793 she rejoined him in Switzerland, accompanied by Madame de Genlis, her former governess, but having spent their money they took refuge in a convent. Ten years later she met her brother in Spain, and was with him until the restoration, using her influence to induce him to accept the crown. She died two months before his fall.

ADELAIDE, SAINT, b. about 933, d. 999; queen of Italy and empress of Germany, daughter of Rudolph II. of Burgundy. She was married to Lothaire II., son of Hugo, king of Italy; after Lothaire's death his successor imprisoned her because she would not marry his deformed son, but she escaped and was protected by Otho the Great, who married her, and crowned her empress of the west in 962. During his reign she exercised much influence in Germany, and also over her son, who succeeded him, and over her grandson during his minority. She was called "the mother of kingdoms," and was regarded as a saint, though not in the calendar, her day being Dec. 16.

ADELSBERG, a district and market t. in Carniola, in the vicinity of which is a large stalactite cavern called the *A. grotto*, through which flows a rapid stream. This cavern, the largest in Europe, is divided into the old and the new grotto: the former is 858 ft. in length; the latter, 8550 ft. in length, contains some most remarkable stalactites, among which is "the curtain" (*vorhang*), a white semi-transparent wall. The t. of A. is 22 m. n.e. of Trieste.

ADELUNG, FRIEDRICH VON, 1768-1843; a German philologist. He was tutor of the sons of emperor Alexander of Russia, Nicholas (afterwards czar), and Michael; also a counselor of state. He wrote *The Relations between the Sanscrit and the Russian Languages*, and *An Essay on the Sanscrit Literature and Language*.

ADELUNG, JOH. CHRISTOPH, a distinguished linguist and lexicographer, was b. 1732, in Pomerania, and d. 1806, at Dresden, where he had held the office of chief librarian. His chief works are his *Wörterbuch der Hochdeutschen Mundart* (dictionary of high German), in which he took Dr. Johnson as his model; and his *Mithridates oder allgemeine Sprachenkunde*, a work on general philology.

ADEN, a peninsula and t. on the s.w. coast of Arabia. The most southern promontory of the peninsula, cape Aden, is in n. lat. 12° 47', and e. long. 45° 9'. This peninsula, the area of which is 18 to 20 sq. m., is doubtless of volcanic origin, and consists chiefly of a range of hills not exceeding 1776 ft. in height. It is joined to the mainland by a narrow, level and sandy isthmus. In a valley which forms the crater of a submarine volcano, stands the t. of A., which is also named from the neighboring promontory, Babel-Mandeb, or the gate of Mandeb. It was styled by the native Arabs Aden or Eden (paradise), on account of its fine climate and great commerce, for which it was celebrated from the oldest times. It enjoys almost perpetual sunshine; a cloudy day is of rare occurrence; the heat is pleasantly tempered by the sea-breezes; and the inhabitants are generally healthy. Pliny the Elder seems to have known the native name of the place, for which he writes "Athana." It was also known by the name of "Emporium Romanum." Up to the time of the circumnavigation of Africa, A., so favorably situated at the entrance of the Red sea, was the chief mart of all Asiatic produce and manufactures, and even the Chinese traded here. Marco Polo and other voyagers of the middle ages told wonders of the riches and splendor of the place. In the course of time, however, it was reduced to a small village, which in 1838 contained only about 600

inhabitants, including some 250 Jews and about 50 Indian merchants. The Anglo-Indian government had long been on the outlook for a speedy route by steam from India to Europe. The explorations on the river Euphrates afforded no satisfactory results, and ultimately the old commercial route by the Red sea was chosen. This, of course, gave to the shores and harbors of that sea a new importance, and the English soon saw the advantages of a position like that of A. About this time, a British vessel suffered shipwreck off the coast of A., where the passengers were plundered and in other ways ill treated by the natives. A vessel was therefore dispatched from Bombay, in 1838, to compel the sultan of the country to make restitution, and also to learn on what terms the Arabs would be willing to cede A. to the English. Capt. Haynes, by fair promises, succeeded in gaining a cession of the country from the sultan, a weak and covetous old man. Afterwards, fearing the displeasure of some neighboring tribes, and partly moved by the suggestions of religious sheiks, the sultan repented of the transaction, but was held to his contract by force of arms; and on Jan. 11, 1839, after a few hours' contest, A. fell into the hands of the British. Here they have now a strong garrison and fortifications. In its medieval prosperity, A. had had a magnificent system of cisterns for collecting the rain-water from the circle of hills that surrounds it. Who built them is unknown; but it is conjectured that they had been begun about the 6th or 7th c. They had been allowed to fall into disuse, and were filled with rubbish, and in ruins; but recently a considerable number have been excavated and restored by the British government. A. is of great importance from a mercantile and nautical point of view, having a position between Asia and Africa like that of Gibraltar between Europe and Africa. The population and resources of the place have rapidly increased since 1838, and the opening of the Suez canal in 1869 gave it a great impetus. The values of its imports and of its exports amount yearly to several millions of pounds. It had ('91) a population of 42,000, gathered from every nation under heaven. Aden is a telegraphic station on the cable between Suez and Bombay, laid down in 1870.

ADENITIS and **ANGEIOLEUCITIS** are the terms employed in medicine to indicate inflammation of the lymphatic glands and inflammation of the lymphatic vessels respectively. In most instances of inflammation in the absorbent or lymphatic system, the vessels and glands are simultaneously involved. Although there is plenty of evidence, from the examination of the dead body, that inflammation of the lymphatics may occur internally, it is only observed in the living subject in connection with the skin or an ulcerated surface. The disease usually originates in an open wound of almost any form, as a puncture, a cut, or a blister. This wound is directly infected by some morbid matter, as, for example, some local inflammatory product, such as the putrid secretion of a sore; but more commonly by some irritating or poisonous matter from without, or some gaseous matter. The inflammation that is thus set up in the lymphatics always extends upwards from the wound, and may be traced by lines of redness following the course of these vessels, and not of the veins, and terminating where the inflamed vessels enter a gland. In the arm, for example, they never pass the armpit, in which the axillary glands lie. The tenderness along these inflamed tracts is excessive, and extends to the next gland, which appears to arrest the further progress of the poisoned lymph, by becoming itself inflamed. The degree of inflammation of the gland may vary from slight enlargement with tenderness on pressure, to profuse suppuration. The suppuration may not take place till a week or more after the inflammation of the vessels has subsided, and may excite no rigors or other constitutional symptoms; and a patient may be quite unconscious that there is anything serious the matter with him, when half a pint or more of matter may be collecting in and around a gland in the armpit. The constitutional symptoms attending an attack of acute inflammation of the lymphatic vessels (*angeioleucitis*) are often severe, and are thus summed up by Mr. Moore in his essay "On Diseases of the Absorbent System" in Holmes's *System of Surgery*: "Rigors, nausea and vomiting, heat of skin, thirst, dryness and coating of the tongue, with constipation, sleeplessness, and a feeling of languor, are usually the severest accompaniments of the disease. If the fever be typhoid, if there be profuse fetid sweats, severe muscular pains, high excitement, or dry burning heat of the skin, and marked delirium, the poison is no longer limited within the lymphatic channels, but has infiltrated the cellular tissues, and has tainted the blood. As the inflammation subsides, a cutaneous eruption or fetid discharge from the bowels comes on, and the general symptoms become those of exhaustion."

The following observations on the treatment of inflamed absorbents are mainly taken from Mr. Moore's essay. Many of the ordinary duties of life perpetually expose manual laborers and others to this painful affection. In the way of prevention, the practice of smearing the hands with oil or grease before touching noxious fluids, is found to prevent the mischief which might arise from absorption by a cut or sore, and is a useful precaution in dissection and in post-mortem examinations; and there can be no doubt that the timely application of a layer of collodion or of court-plaster might avert many attacks of inflamed absorbents. When symptoms of this form of inflammation supervene, the wound should be thoroughly cleansed, by being laid more open, if all its parts are not freely exposed, and then put under a stream of water, syringed, or soaked in a hot bath, as may seem most suitable. If recent or punctured, it should be sucked, and then freely

touched with a pencil of nitrate of silver. If flabby, it should be treated with a stimulating lotion of sulphate of zinc or of copper; if fetid, it should be wrapped in a solution of Condy's fluid, or in chlorinated lotions; and if sloughy, it should be covered with Peruvian balsam and a poultice of linseed meal, charcoal, or yeast. A warm poultice of one of these kinds, frequently changed, is usually the most soothing application. At the same time, nitrate of silver should be two or three times drawn along the red tender lines indicating the course of the lymphatics, after which the arm should be enveloped in cotton-wool; and perfect rest in a comfortable position enjoined. Due attention must at the same time be paid to the general condition of the system, and especially to the condition of the intestinal secretions.

ADENOCELE (Gr. *adēnē*, a gland, and *kēlē*, a tumor) is the term now employed in surgery to indicate a kind of new growth in the female breast, the tissue of which closely resembles the breast-tissue itself. It is synonymous with the terms "chronic mammary tumor," "pancreatic sarcoma," "mammary glandular tumor," "hydatid disease of the breast," "serocystic sarcoma," etc. The diversity of names indicates the diversity of the outward forms seen in these growths. See **TUMORS**.

ADER'NO (ancient *Adranum*), a t. of Sicily, 17 m. n.w. from Catania. It is situated at the base of Mt. Etna, close to the Simeto, on which are some remarkable cascades near the town. It is surrounded by walls, is a very clean town, and is full of convents and nunneries, mostly founded by the Normans, so that bare walls of lava and grated windows appear everywhere, and the sound of bells is almost incessantly heard. Pop. about 16,000.

ADERSBACH ROCKS, a remarkable labyrinthine group of sandstone rocks situated near the village of Adersbach, in Bohemia. The aspect of some parts of the group has been compared to that of a city ruined by a conflagration. One of the pinnacles rises to a height of 218 ft. The structure of the rocks has been produced, not by any commotion of the earth, but by the influences of rain, frost, and other atmospheric changes, wearing down the soft sandstone into many fantastic forms. During the thirty years' war, the miserable people of Bohemia often found refuge in this locality.

ADESSENIANS (Lat., *adesse*, to be present), persons holding that there is a real presence of Christ in the Eucharist, but denying that this presence is effected by transubstantiation. This sect existed in the sixteenth century. Their doctrine was a form of impanation (q.v.), viz., "Non adesse in Eucharistia humanum seu carneum Christi corpus sumptum ex B. Virgine Matre sed *corpus panaceum* assumptum a verbo."

ADES TE FIDEL'ES, known as the "Portuguese Hymn," because the duke of Leeds, who first heard it in the Portuguese chapel, mistook it for a portion of the service. It was composed by the author of "*Dulce Domum*."

ADET, PIERRE AUGUSTE, 1763-1832; a French politician and chemist. He was sent in 1795 as minister to the U.S., where he presented a tricolored flag to congress on behalf of the French nation. He also delivered the decree in which France complained that the U. S. treaty with England had violated neutrality, after which he published a flaming manifesto to the people and went back, or was recalled, to France, where, in 1809, he was a member of the deputies. He published *Elements of Chemistry*.

ADHESION is the species of attraction that is manifested between two separate bodies when their surfaces are brought to a considerable extent into close contact. It is nearly allied to cohesion (q.v.). A. is seen in the case of two solid bodies when their polished surfaces are laid on one another; but it acts more powerfully between solids and fluids, owing to their intimate contact. We have instances of this in the film of water adhering to any body dipped in that fluid, and in water running down the side of an inclined vessel from which it is being poured. All solids and liquids do not exhibit this mutual attraction. Thus, though bright metals are wetted by mercury, glass and wood are not; nor does water adhere to fat. Capillary action (q.v.) is a special manifestation of A. —The A. of gases to the surface of solids is described by Liebig as playing an important part in many processes. A more or less condensed atmosphere of gases surrounds every body, and every particle of a powdered or porous body; and gases, such as oxygen, have in this condition an intensified chemical action. Platinum in the state of powder condenses 800 times its volume of oxygen; and when hydrogen comes in contact with the oxygen in this state, the two gases combine, though, when free, they require the application of flame before they will combine.

ADHESION, in pathology, is when two surfaces of a living body become united. If they have been separated by the cut of a sharp instrument, and are immediately and accurately placed in apposition to each other, they may adhere at once without any apparent bond of union. But, generally, the blood-vessels of the part pour out, between the surfaces, a fluid, consisting of the watery part of the blood holding fibrine in solution. The liquid part of this is reabsorbed or escapes from the wound, leaving the fibrine, in which first cells are developed, and then blood-vessels: it is now a living tissue, and forms a uniting medium between the sides of the wound.

Serous membranes, as the pleura, pour out this fluid when inflamed; and hence the adhesions so often the result of pleurisies.—If two granulating (see **GRANULATIONS**) surfaces be kept in contact, the opposite granulations may fuse together, and the wound unite by secondary adhesion.

ADHESION, in botany, means the union of parts in a plant which are separate in other plants, or in the younger states of the same plant. What we are accustomed to consider parts of different nature only seem so in consequence of the way in which *A.* occurs. A leaf is said to be stem-clasping when its base partially surrounds the stem; while a stem which seems to pierce through the leaf is said to be perfoliate; but they differ only in this, that in the former the lobes at the base of the leaf embrace the stem without adhering, while in the latter they not only clasp the stem, but grow together where their margins come in contact. The leaves of the pitcher plant, formerly thought to be special organs without analogy, are known to be leaves so rolled up that their margins have touched and adhered. Other leaves, growing from opposite sides of the stem, adhere because their bases are connate, as in the honeysuckle; and yet others grow in a whorl, or all round a stem upon the same plane, and adhere at their margins, forming a sheath in the calyx. All the sepals are often distinct, as in the buttercup; but they also often adhere by their edge and form a cup, as in the cherry. In the corolla the petals are either all separate, as in the rose, or adhere by their edges, as in heaths. In the rose, the stamens are all distinct from each other; in the geranium they slightly adhere at the base; in the mallow they adhere in a partial tube; in other plants they grow into a complete tube. Certain parts of the pistil are called carpels, each of which is a hollow body terminated by a stigma. These carpels are hollow, because they are formed of a flat organ doubled up so that its edges come in contact and adhere. Sometimes only one carpel is present, as in the cherry; sometimes several, as in the rose. In the nicella the styles of the carpels are all distinct; in the lily and the myrtle the styles adhere so completely that there seems to be but one. In the apple the calyx seems to grow from the top of the fruit. This is because the carpels adhere to the inside of the calyx, which grows with the fruit, and leaves its extremities in a withered state near the top of the carpels. In the cherry no *A.* takes place between the carpels and the calyx; and, consequently, when the fruit is ripe there is no trace of the calyx upon the upper end of the drupe. In the raspberry the fruit slips like a thimble from the receptacle, because the carpels all adhere by their sides.

ADIAN'TUM. See **MAIDENHAIR**.

ADIAPHORISTS, the name given to Melancthon and those who agreed with him in submitting, in things indifferent, to an imperial edict. When, in 1548, Charles V. issued an edict called the interim, relating to disputed religious doctrines, the Protestants became involved in a controversy in which this name originated.

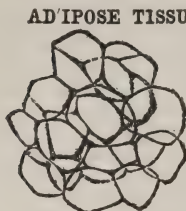
ADIGÉ, after the Po, the most important river in Italy, rises in the Rhætian Alps. Various streamlets descend from these mountains, and, uniting at Glarus, form the Etsch, which is, properly speaking, the beginning of the *A.*, and the name by which the entire river is known in Germany. From Glarus it flows e. into the Tyrol; then, after a slight *détour* to the s.e., it flows due s., past Trent and Rovereto, into Lombardy, and, passing Verona, takes a s.e. sweep, discharging its waters into the Adriatic, between the mouths of the Po and the Brenta. In ancient times (when it was called the *Adthesis*), it had a more northerly *embouchure*. It is very rapid, and subject to sudden swellings and overflowings, which cause great damage to the surrounding country. The two most remarkable inundations on record are those which occurred in 1721 and 1724. During the Italian wars its banks were repeatedly the scenes of bloody engagements. Its length is about 250 m.; its breadth in the plain of Lombardy, 650 ft.; its depth, from 10 to 16 ft. It is navigable as far as Branzoll in the Tyrol, but the navigation is difficult on account of the swiftness of the current. The *A.* is a transit river for the trade of Germany and Italy.

A'DIPIC ACID $C_4H_6(COOH)_2$ is a dibasic acid of the oxalic series, having the general formula $C_nH_{2n-2}O_4$; and is obtained in the form of white, opaque, hemispherical nodules (which are probably aggregations of small crystals), by the oxidizing action of nitric acid on oleic acid, suet, spermaceti, and other fatty bodies. The name is derived from the Latin *adepts*, fat, and must not be confounded with that of a similar acid of the same group, known as *sebacic acid*.

ADIPOCERE (Lat. *adepts*, fat, and *cera*, wax), a substance resembling a mixture of fat and wax, and resulting from the decomposition of animal bodies in moist places or under water. Human bodies have been found, on disinterment, reduced to this state. Lean beef kept under running water for three weeks, was found reduced to a fatty substance. A piece of a liver that has suffered what is called fatty degeneration, if immersed for some time in water, is said to become exactly like adipocere.

ADIPOSE SUBSTANCES are fatty matters—stearine, margarine, and oleine being the most notable—present in some degree in most animal and in some vegetable organisms. They consist of carbon, hydrogen and oxygen, combined in varied proportions; they crystallize at low and are fluid at high temperatures; are combustible; are insoluble in water, but soluble in each other, in ether, alcohol, naphtha, bisulphide of carbon, etc. They differ in their atomic construction, and in the temperatures at which they solidify; pure stearine is solid at 140° F., while oleine is fluid to near the freezing point of water. Stearine is most abundant in hard fats, as tallow; oleine in the more fluid fats or oils. These substances, combined with glycerine (q.v.), exist in adipose tissue, microscopic in the cells of the liver and of some cartilages, in the substance of the brain and nerves, in marrow, in chyle, milk, and the yolk of eggs. A healthy appetite craves a certain

amount of fat-producing food, furnished either by the animal tissues which contain it, or from vegetable sources, as nuts, olives, Indian corn, and other seeds. The larger proportion of fats is formed in the processes of digestion from the starch and sugar of the food consumed by men and animals.



ADIPOSE TISSUE,
magnified.

ADIPOSE TISSUE is a peculiar kind of animal membrane or tissue, consisting of an aggregation of minute spherical pouches or vesicles filled with fat or oil. The tissue itself is organic and vital, the vesicles secreting the fatty matter from the capillary blood-vessels with which they are surrounded; the secreted product—the fat—is inorganic, and is devoid of vitality. The A. T. differs from cellular or filamentous tissue in having the vesicles closed, so that the fat does not escape even when fluid. A dropsical effusion, which infiltrates the filamentous tissues, does not affect the A. T. There is a considerable layer of A. T. immediately under the skin; also around the large vessels and nerves, in the omentum and mesentery, around the kidneys, joints, etc. See **FATS, ANIMAL**.

ADIRON DACKS, a cluster of mountains in northern N. Y., terminating in the Catskills. The largest number and the highest peaks are in Essex co. Mt. Marcy, 5379 ft., is exceeded in this part of the country only by Mt. Washington. The A. cover about $2\frac{1}{2}^{\circ}$ of lat. and $1\frac{1}{2}^{\circ}$ of long., the general direction being from n.e. to s.s.w. The peaks are conical, the slopes abrupt, and the scenery is wild and grand. The rivers Saranac and Ausable flow from them, n.e., and the Hudson, Cedar and Boreas to the s. In the tract are many ponds and lakes; Racquette Lake, very irregular in outline, being the largest. Some of these lakes are 1700 ft. above sea level. The A. region once abounded in caribou, moose, deer, bear, panther, beaver, otter, and smaller game, and is now famous for salmon, trout, pike, and other game fish. Caribou are gone, and moose nearly so, but it is still a favorite hunting country. Of late years the A. region has been a popular summer resort for those who desire life in camp, or wild scenery. There is little agriculture, but a large business in lumber, white pine being the most important. Magnetic iron ore has been worked, but abandoned because of the cost of transportation to market. In 1892 the state of New York set apart an area of 2,807,760 acres for a public park under the management of officers appointed by the State Forest Commission. The main object in this arrangement was to protect the watersheds and preserve the forests. See **NEW YORK**.

ADIT, a nearly horizontal passage opened for the purpose of draining a mine; it serves incidentally to explore the rock through which it passes; when filled with water, often used as a canal by which the products of the mine may be transported. Water raised from a depth greater than that reached by the A. is discharged through it, saving the cost of raising still farther to the top of the shaft. An A. opens in Cornwall at the level of the sea, and extends inland about 30 m., draining the district of Gwennap. It meets some shafts at the depth of 400 ft. The "Ernest August" adit in the Hartz, completed in 1864, is 13 m. long. The Joseph II. A. at Schemnitz, in Hungary, is 10 ft. high, $5\frac{1}{2}$ ft. wide, extends 10 m. to the valley of the Gran, and is used as a canal and a railway.

ADJECTIVE is the name of one of the classes into which grammarians have divided words. An A. is so called, not so much from its *being added* to a substantive, as because it *adds* to the meaning, or more exactly describes the object, than the simple substantive or general name does. The effect of an A. is also to limit the application of the name to which it is joined. Thus, when *tall* is joined to *man*, there is more meaning conveyed; there are more properties suggested to the mind by the compound name *tall man*, than by the simple name *man*; but *tall man* is not applicable to so many individuals as *man*, for all men that are not tall are excluded.—Nouns, or names of things, are often used in English as adjectives; thus, we say a *silver chain*, a *stone wall*. In such expressions as "income-tax assessment bill," *income* plays the part of an A. to *tax*, which is, in the first place, a noun; the two together then form a sort of compound A. to *assessment*; and the three, taken together, a still more compound A. to *bill*, which, syntactically, is the only noun in the expression. This usage seems peculiar to English.—Languages differ much in their way of using adjectives. In English, the usual place of the A. is before the noun. This is also the case in German; but in French and Italian it comes after. In these languages, again, the A. is varied for gender, number, and in the German for case. In English it is invariable; and in this simplicity there is a decided superiority; for in modern languages these changes in the A. serve no purpose. The only modification the English A. is capable of is for degrees of comparison.

ADJECTIVE COLORS are colors which need to be fixed by some base or mordant to render them permanent.

ADJUDICATION is a technical term used in the practice both of the English and Scotch law, but with a totally different meaning in the two systems. In the law of England, the term A. is commonly used to denote the judicial determination at a certain stage of the proceedings in bankruptcy. The procedure is regulated by 32 and 33 Vict. c. 71. The petition prays that the trader may be adjudicated a bankrupt, and, after proof of the petitioning creditor's debt, and of the act of bankruptcy, which must have been committed within twelve months before the issuing of the fiat, an A. is made by the

court that the party is bankrupt. Formerly, a trader might be adjudicated bankrupt summarily, and without previous petition for A.—namely, where, after filing a petition for arrangement with his creditors, he appeared not entitled to the benefit of the arrangement. In *insolvency*, which differs from bankruptcy in this respect, that it is not confined in its operation to traders, or to any particular class of men, but applies to the community at large, the A. is made by the debtor delivering into the London bankruptcy court, if the debtor resides or carries on business within the district of that court, or in the bankruptcy court of the district within which he resides or carries on business, a declaration admitting his inability to pay his debts, which may be used as the ground of an A. by his creditors, if the court think it requisite; or if the creditors neglect to pass a resolution for liquidation or composition, or resolve in favor of bankruptcy; or if, after the passing of a resolution for liquidation or composition, the court shall for some sufficient cause adjudge the debtor bankrupt. This A. authorizes the discharge of the prisoner from custody as to all debts and sums of money due or claimed to be due to his several creditors. See *INSOLVENCY*.

The distinction between bankruptcy and insolvency has for some time been generally disapproved in England; and it may now be held as practically abolished. The insolvent debtors court is abolished, and its jurisdiction transferred to the bankruptcy court. Insolvent persons can now be adjudged bankrupts in every case in which their creditors wish that, or the court think it proper.

ADJUST MENT, in the law of insurance, is the ascertaining the exact amount of indemnity which the party insured is entitled to receive under the policy, and fixing the proportion of the loss to be borne by each underwriter. The nature and amount of damage being ascertained, an indorsement is made on the back of the policy, declaring the proportion of loss falling on each underwriter; and on this indorsement being signed by the latter, the loss is said to have been adjusted. After an A. has been made, it is usual for the underwriter at once to pay the loss. As a question of law, however, it does not appear to have been decided how far the A. is conclusive and binding upon the underwriters. In the opinion of some mercantile lawyers, the A. is merely presumptive evidence against an insurer, and it is, notwithstanding, open to the underwriter to show facts which, if proved, would have the effect of relieving him from liability.

ADJUTANT, *Ciconia argala*, a bird closely allied to the stork, made by some naturalists the type of a separate genus, *argala*. Adjutant is the popular name given to it by the English in India—*argala* the native name. It is a native of the warmer parts of India. It is of large size, and has very long legs; in its erect attitude, it is about 5 ft. high; its extended wings measure 14 or 15 ft. from tip to tip; its head and neck are nearly bare; a sausage-like pouch hangs from the under part of the neck; the bill is of enormous size. It is very voracious, swallows a cat or a leg of mutton quite readily, and is of great use in devouring snakes, lizards, and all sorts of offal. It sometimes catches birds upon the wing. The beautiful marabout feathers are obtained from the under side of the wings of this bird, and of another very similar species which inhabits Senegal.

ADJUTANT, a regimental staff-officer appointed to assist the commanding officer of a regiment in the discharge of the details of his military duty. The title is also given to officers having similar functions attached to larger or smaller divisions of troops, to garrisons, and to the war department of the U. S. government. Adjutants are also assigned, as in the English army, to divisions of artillery. Formerly in England called *aid-major*. A post adjutant holds the office of adjutant with reference to the organization, of whatever character of the troops stationed at a post, garrison, or camp. The adjutant's duties are unremitting, he receives orders and promulgates them to the several companies, inspects escorts and guards before proceeding to their duty, attends the drill of recruits, is accountable for the keeping of the regimental books, and ought to note every infraction of the rules. In fact nothing that goes on within the limits of his command should escape his attention and observation.

ADJUTANT-GENERAL, a military staff-officer, the chief assistant of a commanding general in the execution of his military duties, as in issuing and executing orders, receiving and registering reports, regulating details of the service, and so forth. He is a principal officer of the War Department (see *ARMY ADMINISTRATION*). Most of the individual states also have adjutants-general, performing similar duties with respect to the militia of their several states. In the British service the adjutant-general is an officer of the full rank of general, having a body of assistants at headquarters in London.

ADJYGURH, a t. of British India, in the n.w. provinces, province of Allahabad, 69 m. w.n.w. from Rewah. It has a fortress, situated on a very steep hill, and accessible only by well-defended paths. The hill, which is of granite, is isolated, and separated from the n.w. edge of a plateau by a very deep and impassable ravine. Within the walls of the fort are two great masses of ruins of temples, resembling in architectural character those of Southern India, and covered with the most elaborate sculptures. A. was for a short time the capital of a small Mahratta state, was taken by the British under lieutenant-col. Martindell, in 1809, after an obstinate resistance, and restored to its previous possessors, who were Rajpûts. The native line of rajahs became extinct in 1855. Except the summit of the hill, occupied by the fort, which is healthy, A. is very subject to malaria. The fort is 860 ft. above the town, which is 480 ft. above the sea. Pop. about 5000.

AD LATUS, a person who assists an official, such as interpreter for an ambassador who does not speak the language of a court. Sometimes, as in Austria, general officers act *ad latus* to corps or provincial commanders.

ADLER, FELIX, b. Alzey, Germany, 1851; son of an eminent Jewish rabbi. He came to the U. S. when very young, was for a time professor at Cornell university, and in 1876 organized in New York the society for ethical culture, at first composed only of young Jews of liberal tendencies, but which soon drew in large accessions from radical thinkers of other races. Mr. A. is a vigorous writer and speaker. He has published *Creed and Deed* (1876), and *The Moral Instruction of Children* (1892).

ADLER, GEORGE J., PH. D., 1821-68; a native of Germany. He came to the U. S. when 12 years old, and was professor of German in the N. Y. university from 1846 to 1854, and a teacher and writer of books of education for some years later. Among his works are a German grammar, a reader and a dictionary of English and German, a Latin grammar, and various translations. His *Letters of a Lunatic* appeared but a short time before he became an inmate of the asylum for the insane in which he died.

ADLER, HERMANN, PH. D., Chief Rabbi, b. in Hanover, in 1839; son of Nathan Marcus Adler; educated at University College, London; became principal of the Jews' College in 1863, minister of the Jewish Synagogue at Bayswater in 1864, and chief rabbi, on the death of his father in 1891; author of several controversial works and articles in reviews.

ADLER, NATHAN MARCUS, D.D., Chief Rabbi, was born in Hanover in 1803, and educated at the Universities of Göttingen, Erlangen, and Würzburg. He was appointed Chief Rabbi of Oldenburg, 1829, and of Hanover and the provinces a year later, and, July 9th, 1845, Chief Rabbi of the United Congregations of the British Empire. He published several important Hebrew works, among them *Nethina Lagér*, a commentary on the *Targum of Onkelos*, besides several volumes of sermons, including *Sermons on the Jewish Faith*, and his farewell sermon to his congregation at Hanover. He died in 1890.

ADLERBERG, VLADIMIR FEDOROVITCH, Count; born 1790; a Russian statesman. In 1817 he was adjutant to the grand duke Nicholas, and later his especial companion: in 1852 he was minister to the court, in constant attendance on the emperor, and kept the position under Alexander II., retiring in 1869 on account of old age. He was postmaster-general, and was the author of many reforms in the service. He d. 1884.

ADLERCREUTZ, KARL JOHANN, Count, 1757-1815; a Swedish general in the Finnish-Russian war in 1808, and one of the leaders who arrested Gustavus IV. in his palace. He was made lieut.-gen. in 1809, and count in 1814.

ADLERSPARRE, GEORG, Count, 1760-1835; a confidant of Gustavus III. of Sweden. He was in the campaign against the Russians in 1809, and one of those who arrested Gustavus IV., for which he received the public thanks of the diet and was promoted to high dignity. In 1831 he was fined for publishing secret state papers, and private correspondence with princes.

ADLERSPARRE, KARL AUGUST, Count, 1810-62; eldest son of Georg, and author of poems and novels and historical works.

AD LIBITUM (in Ital., a *piacere* or a *piacimento*) is a musical term which implies that the part so marked may be performed according to the taste of the performer, and not necessarily in strict time. When there is an accompaniment to the music thus marked, it must strictly follow the A. L. time of the principal performer. Sometimes the words, *colla parte*, meaning with the leading part, are written over the accompanying parts. A. L. also frequently means that a part for a particular instrument or instruments, in instrumental scores or pianoforte arrangements, may either be played or entirely left out, thus: "Overture arranged for the pianoforte as a duet, with *ad libitum* accompaniments for the violin, flute, or violoncello."

ADMETUS, a mythical king of Phææ, in Thessaly, succeeding his father, Phææ. He was in the Calydonian hunt and the Argonautic expedition; Apollo was his herdsman for a year while banished from Olympus. He was husband of Alcestis, daughter of Pelias, and got exemption from death on condition that his father, mother or wife would voluntarily die in his stead; this Alcestis offered to do, but Hercules rescued her from Pluto and restored her to Admetus.

ADMINISTRATION, in politics, in its widest sense, is equivalent to the executive government of a state, as distinguished from its permanent constitution, and embraces not only the political ministry, but all the offices of judicature, etc. In a more restricted sense, as used in England, it designates the privy council (q.v.), and more especially that select committee of it known as the cabinet or ministry (q.v.); while in the United States it is applied to the executive department of the federal government, e.g., the President and the members of his cabinet.

Administration in American politics is a general term given to the federal or a state executive government. We speak of Washington's A., meaning the federal executive government during the time in which he was president; and of the policy, acts, omissions, errors, etc., of the A. of the nation or of any state. The supporters of the officials at the time in power are called the A. party. The "cabinet" is sometimes used as synonymous with the federal administration.

ADMINISTRATION and ADMINISTRATOR. An administrator, in the law of England, is the person to whom, in default of an executor named in the will, the ordinary or bishop of the diocese commits the administration or distribution of the estate of a person dying intestate. The appointment of administrators is made in the United States by a judge, called in many states a judge of probate. In New York the title of this officer is surrogate, the name being derived from that of the bishop's deputy, to whom, in England, such matters were formerly intrusted.

ADMIRABLE CRICHTON. See CRICHTON, JAMES.

ADMIRABLE DOCTOR, a translation of the Latin, *Doctor Admirabilis*, a title given to Friar Roger Bacon (1214-1292) on account of his extensive knowledge.

ADMIRAL, the title of the highest rank of naval officers. The word is generally supposed to have been derived from the Arabic *emir* or *amir*, a lord or chief (*amir-al-mumenim*, "commander of the faithful"; *amir-al-omra*, "commander of the forces"). Thus the early English form was *amiral* or *ammiral* (occurring once in *Par. Lost*); and so it is still preserved in French. In Spanish the word is *admirante* or *almirante*; in Italian, *ammiraglio*. The term seems to have been introduced into Europe during the crusades, and to have been first used in a definite sense by the Sicilians, and afterwards by the Genoese. About the end of the 13th c. it came into use in France and England. The first English admiral of the seas (*amiral de la mer du roy d'Angleterre*) of whom there is record was William de Leybourne, 1286. His office, however, was not that of a commander, but embraced those general and extensive powers afterwards associated with the title of lord high admiral of England; that is, both the administrative functions now vested in the *lords commissioners of the admiralty* (five in number), and the judicial authority belonging to the present high court of admiralty. The office of lord high admiral was last filled by the duke of Clarence, afterwards William IV. It had previously been in commission from 1708 to 1827. On his resignation in 1828, the office was again put in commission. See ADMIRALTY COURT.

In the British navy the admirals are distinguished into three classes: Admirals, vice-admirals, and rear-admirals; the admiral carrying his colors at the main, the vice-admiral at the fore, and the rear-admiral at the mizzen mast-head. In former times, each grade was subdivided into three sections, known as admirals (or vice or rear admirals) of the red, of the white, and of the blue, respectively. The flag hoisted by the admiral (thence called a flag-officer) agreed in color with his section; and all the ships under his command carried ensign and pendant of the same hue; but the distinction was otherwise without practical effect, and is now abolished. *Admiral of the fleet* is a higher rank, conferred at the will of the sovereign. The rates of full or sea pay of flag-officers are as follows: Admiral of the fleet, per day, £8; admiral, £5; vice-admiral, £4; rear-admiral, £3. An admiral commanding-in-chief receives £3 a day additional at home, and £4 10s. abroad as table-money. In 1896 there were sixty-eight flag-officers in the British navy: viz., three admirals of the fleet, ten admirals, thirty vice-admirals, and thirty-five rear-admirals; and on retired and reserve pay, three admirals of the fleet, six admirals, fifteen vice-admirals, and twenty-three rear-admirals. The admiral of the fleet takes rank with a field-marshal, admirals with generals, vice-admirals with lieutenant-generals, and rear-admirals with major-generals.

The grades of admiral, vice-admiral, and rear-admiral in the United States navy were created by act of congress, primarily for the purpose of bestowing exceptional distinction on the great captain of the civil war, David G. Farragut (q.v.). The first of the grades, rear-admiral, together with the rank of commodore, was created in 1862, and congress limited the number of rear-admirals on the active list to nine. In 1864, the President was authorized to appoint one of the rear-admirals a vice-admiral, who should thus become the ranking officer in the service. Captain Farragut, under these laws, became the first commodore, first rear-admiral, and first vice-admiral, and on being advanced to the last grade, Commodore David D. Porter (q.v.) succeeded him as ranking rear-admiral. In 1866, congress provided for an active list of one admiral, one vice-admiral, and ten rear-admirals. Farragut was promoted to admiral and Porter to vice-admiral. On the death of Farragut (1870), Porter became admiral, and Rear-Admiral Stephen Clegg Rowan was promoted to vice-admiral. With the death of Porter (1891) and Rowan (1890) the grades of admiral and vice-admiral became extinct under the act of 1866. In 1892 congress reduced the number of rear-admirals on the active list to six. Under the first two acts, the admiral ranked relatively with the general of the army, the vice-admiral with the lieutenant-general, and rear-admirals with major-generals. The ranks of general and lieutenant-general of the army were created for a similar object, and became extinct also on the death of Gen. Philip H. Sheridan (q.v.) in 1888. The pay of the admiral was \$13,000 per annum, wherever stationed, and that of the vice-admiral was \$9000 per annum at sea, \$8000 on shore duty, and \$6000 on leave or waiting orders. All rear-admirals receive \$6000 for sea duty, \$5000 for shore duty, and \$4000

while on leave or waiting orders. The flag of the admiral was a rectangular blue field with four white stars, and was flown at the main; that of the vice-admiral was a similar field with three stars. Rear-admirals' flags are generally of the same shape and color, carry two stars, and are flown at the mizzen, excepting that when several officers of this grade are together simultaneously the senior officer displays the regulation blue flag, the second in rank a red field, and the junior, a white field. A commodore by lineal rank assigned to a duty prescribed for a rear-admiral has the pay, honors, and flag of a rear-admiral while so employed, and at the end of the special service resumes the functions of his actual rank. Rear-admirals on the retired list receive annually seventy-five per cent. of their sea pay, or \$4,500.

ADMIRALTY COURT. This court—whose functions are now exercised by the probate, divorce, and admiralty division of the high court of justice, constituted in 1873-5—was created to try and decide maritime causes. Formerly the maritime courts of England were divided into the *instance court*, a permanent institution, and the *prize court*, which lasted only during war, or until the litigations to which it had given rise were concluded. Whilst there was a lord high admiral, the judge of the Admiralty Court usually presided by virtue of a patent from him; but since the office has been entrusted to commissioners, the judge holds a direct commission from the crown. Questions of the utmost nicety in international law fall to be decided by the maritime courts in time of war, and it was as an Admiralty judge that many of the most remarkable of Lord Stowell's famous judgments were pronounced. Their civil jurisdiction now extends generally to disputes between part-owners of a ship, suits for mariners' and officers' wages, suits for pilotage, suits on bottomry and respondentia bonds, and relating to salvage, wrecks, collisions of ships, etc. In criminal matters the Admiralty Courts formerly took cognizance of piracy and other offenses at sea, and of certain felonies committed in the main stream of great rivers below the bridges, but their criminal jurisdiction may be now regarded as obsolete. Appeals lie to the court of appeal created by the judicature act of 1873-5.

ADMIRALTY ISLAND lies on the n.w. coast of N. America, between 57° 2' and 58° 24' lat. n., and 134° 52' and 135° 30' long. w. It is about 80 m. long, well wooded and watered. It is inhabited, and belongs to the U. S.

ADMIRALTY ISLANDS, a group of about 40 islands, to the n.e. of New Guinea, between 2° and 3° lat. s., and 146° 18' and 147° 46' long. e. They were discovered by the Dutch in 1616. The largest is about 50 m. long from e. to w. They abound in coconut trees, and are inhabited by savages. Germany established a protectorate here, 1885. See illus., *NEW CALEDONIA, ETC.*, vol. X.

ADMIRALTY JURISDICTION, in American practice, extends, in criminal cases, to offenses committed beyond any national jurisdiction and on the high sea. In civil matters it includes salvage, bottomry, hypothecation, seizures under the laws of trade; navigation or customs; prizes, charters, certain contracts between different states or foreign ports, contracts for conveyances, maritime contributions, pilotage, ship surveys, and in general all cases of trespasses, damages, assaults, etc., on the seas. The district court of the U. S. in which the action is brought has original jurisdiction. There are no admiralty courts so named. Cases may be removed to the circuit and thence to the supreme court. A suit in a civil case is brought by filing a libel, upon which a warrant for arrest or attachment may issue; or there may be a simple notice to appear; or there may be process for the arrest and seizure of the articles. Thereafter stipulations may be made or bail taken. Testimony may be given orally, but in cases of importance it is usually written. No juries are called; the decree of the court ends the matter. In a criminal prosecution under A. J. the proceedings are according to those at common law. With regard to jurisdiction, where a seizure has been made the court of that especial section has jurisdiction, though the act of seizing may have occurred in a different district. In seizures out of special jurisdiction, or on the high seas, the court where the goods, persons or things may be landed has jurisdiction. A district court has also jurisdiction over all torts and injuries committed at sea or within ebb and flow of the tide. In one instance A. J. was held and admitted in a case of collision that happened in an inland state on a river more than 200 m. from the ocean. Any court having A. J. has the power to redress personal wrong treatment of a passenger at sea by the master of a vessel. As a court of admiralty, the district court has, concurrent with common law courts, jurisdiction over maritime contracts without exception as to form or by whomsoever executed, such as charter parties for foreign transit, the wages of seamen, etc. To a certain extent all these matters of jurisdiction apply to our lakes and navigable rivers. Seamen in port, if on tide-water, engaged in commerce, are within A. J.; but hands on ferries are not. Persons actually employed in the navigating of a vessel, such as pilots, engineers, firemen or deckhands, may sue for wages under A. J.; but waiters, musicians, and those who have no part in navigation, cannot. Congress has provided for extraordinary jurisdiction in admiralty in cases of seizure under the navigation, trade or impost laws of the U. S.; but the act reserves to all sailors the common law remedy, where the common law is competent to furnish it. A. J. extends over captures within the waters of the U. S., or within a marine league of land; the civil jurisdiction extends

to seizures on land under federal laws, and suits for penalties and forfeitures incurred under such laws. But in the hearing of seizures on land the court sits as at common law, with jurisdiction distinct from that in case of seizure on navigable waters; and these common law seizures may be tried by jury. Suits to the lower limit of \$100, instituted by the U. S. or an officer thereof, are within A. J. Under this provision the head of a department, as the postmaster general, may sue for money due the government. Lastly, actions by or against our consular representatives are embraced in A. J.

ADMISSION OF NEW STATES. The Constitution of the United States says upon the subject of the admission to the Union of new states (Article IV., Section 3): "New states may be admitted by the Congress into this Union; but no new state shall be formed or erected within the jurisdiction of any other state; nor any state be formed by the junction of two or more states, or parts of states, without the consent of the legislatures of the states concerned, as well as of the Congress."

"The Congress shall have power to dispose of, and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this Constitution shall be so construed as to prejudice any claims of the United States or of any particular state."

The first definite regulations by Congress for the admission of new states were made in 1790, and the general precedents then established in the admission of Vermont (Feb. 18, 1791), the first state to be added to the original thirteen, have become part of the public usage. Before admission, a territory must have a population of at least 60,000, and must have adopted a constitution, and made formal application to Congress for admission. After a bill has passed both Houses and become law, the President issues a proclamation to the effect that the new state is in the enjoyment of all the privileges of statehood; and on the following 4th day of July, another star is added to the cluster on all the national flags.

It must be remembered that no territory has any *right* to be admitted at a particular time. The whole matter is discretionary with Congress. Thus, while Nevada was admitted with a population of barely 60,000 (in 1890 it had dropped to 45,000) and Wyoming with 60,705, attempts to secure the admission of Utah with 207,905 (1890), New Mexico with 153,593 and Arizona with 59,620 were several times defeated.

ADOBE, sun-baked bricks, of fine sand and clay dust, made in the same manner as common bricks, but very smooth and hard. They are much used for building dwellings in Mexico and C. America. Adobe houses are generally of one story, warmer in winter and cooler in summer than wooden or stone buildings.

ADOLPHUS, or **ADOLPH**, of **NASSAU**, 1250-98; son of Walram, count of Nassau. He was the successor of Rudolph, count of Hapsburgh, supplanting the natural heir, and was crowned king of Germany, June 24, 1292. A. agreed for a large subsidy to assist England in her war with France, but failed to fulfill his part of the contract. For certain high-handed acts he was summoned before the college of electoral princes, refused to appear, and was formally deposed in June, 1298, when the crown was restored to Rudolph's son. Both took the field in person, and A. was killed in the first battle.

ADOLPHUS, **FREDERICK**, 1710-71; of the house of Vasa, and duke of Holstein-Gottorp. He was elected to the Swedish throne in 1743, but the royal authority was so circumscribed by the council of the states, or nobles, that he was only a nominal king. In 1769 he offered to resign, but, on some concessions by the nobles, was induced to retain the throne till his death, when his son Gustavus III. succeeded him.

ADOLPHUS, **JOHN**, 1768-1845; an English lawyer, celebrated in criminal practice. He gained much credit in the defense of Arthur Thistlewood, charged with treason in the Cato street conspiracy, in London, 1820. He was the author of a *History of England from the Accession of George III.*, and *Biographical Memoirs of the French Revolution*.

ADOLPHUS, **JOHN LEYCESTER**, 1795-1862, son of John A., a barrister, and the author of a curious book, *Letters to Richard Heber, esq., containing Critical Remarks on the Series of Novels beginning with Waverley, and an Attempt to Ascertain their Author*, in which book he showed that no other than Walter Scott could have produced the novels in question.

ADONAI, signifying "lord," or "my lord," or "master," a proper noun used by Hebrews where "Jehovah" occurs in their scriptures, the latter being deemed the holy name, and not to be openly pronounced. It is said that the true pronunciation of the Hebrew letters for Yahve, or Jehovah, is lost.

ADONIA, feasts in honor of Venus and Adonis. They lasted two days, one of lamentation, and one of mirth, typifying the death and resurrection of nature.

ADONIC VERSE, a dactyl and spondee, or dactyl and trochee, adapted to light, lively versification, as the famous hymn:

"Plaudite celi;
Rideat Æther," etc.

ADONIS, a mythical personage, whose beauty as a child so attracted the love of Venus and Proserpine, that they quarreled about the possession of him. Jupiter, appealed to, settled the dispute by deciding that A. should spend part of the year with Venus, and part with Proserpine, so that he lived eight months of the year in the upper world, and four in the under. A. was afterwards killed by a boar while hunting, and Venus, coming

too late to his rescue, changed his blood into flowers.—A yearly festival was celebrated in honor of A., and consisted of two parts—a mourning for his departure to the under world, and a rejoicing for his return to Venus. This festival, widely spread among the countries bordering on the Mediterranean, was celebrated with peculiar pomp at Alexandria. Connected therewith were the gardens of A., as they were called. Before the festival, wheat, fennel and lettuce were sown in earthen and even in silver pots, and forced by heat; intended to indicate, doubtless, by their brief bloom, the transitoriness of earthly joy. The myths connected with A. belong originally to the e. They display a worship of the powers of nature conjoined with that of the heavenly bodies, and A. himself appears to be the god of the solar year. The similarity of the name to the Phœnician *Adon*, which signified “lord,” is unmistakable; and this word Adon was specially applied to the king of heaven, the sun.—In reference to the brilliant beauty ascribed to A., a beautiful man is called “an Adonis.”

ADONIS, a genus of plants of the natural order *ranunculaceæ* (q. v.), in which the flower has 5 sepals and 5 to 10 petals without scales at the base, and the fruit consists of awnless pericarps. The species are all herbaceous—some of them annual and some perennial. Several are natives of Europe, but only one, *A. autumnalis*, sometimes called pheasant's eye, is a doubtful native of Britain. Its bright scarlet petals have obtained for it the name of *flos Adonis*, their color having been fancifully ascribed to their being stained with the blood of Adonis. It is a well-known ornament of our gardens; in which also *A. æstivalis* frequently appears, and *A. vernalis*, a perennial species common upon the lower hills of the middle and s. of Germany, with early and beautiful flowers.

ADOPTIAN CONTROVERSY, The, was an echo of the Arian controversy, and originated about the end of the 8th c. in Spain, the country in which the doctrine of Arius had longest held out. Elipandus, archbishop of Toledo, and Felix, the learned bishop of Urgel, advanced the opinion that Christ, in respect of his divine nature, was doubtless by nature and generation the Son of God; but that as to his human nature, he must be considered as only declared and adopted through the divine grace to be the first-born Son of God (Rom. viii. 29), just as all holy men are to be adopted as sons of God, although in a less lofty sense. The flame of controversy thus kindled spread into the Frankish empire, the special domain of “Catholic” Christianity, and gave occasion to two synods, one held at Ratisbon (792), and another at Frankfort (794), in which Charlemagne took part in person, and which condemned Adoptianism as heresy. The Catholic doctrine of the unity of the two natures of Christ in one divine person and the consequent impossibility of there being a twofold Son—an original and an adopted—was upheld by Alcuin and the other learned men of Charlemagne's court. At a subsequent synod at Aix-la-Chapelle, Felix, yielding to compulsion, recanted his opinions, without, as it would seem, being convinced. Elipandus adhered fanatically to his views, which were, in after-times, defended by Folmar (1160), Duns Scotus (d. 1308), Durandus (d. 1322), the Jesuit Vasquez (1606), and the Protestant divine Calixtus (1643).

ADOPTION (Lat. *adoptio*); a legal institution of much importance in both of the classical nations of antiquity. A., in the strictest sense, in the Roman law, applied only to the case in which a person in the power of his father or grandfather was transferred to that of the person adopting him. Where the person adopted was already emancipated from the paternal power (*patria potestas*), and was regarded by the law as his own master (*sui juris*), the proceeding was called adrogation (*adrogatio*). A., however, was also used as a generic term comprehending the two species; and in Greece, where there was nothing corresponding to the paternal power of the Romans, this distinction did not obtain. At Athens the adopted child was transferred from his own family and parish or tribe (*demos*) into those of the adoptive father, whose property he inherited in the absence of legitimate children, and whose sacred rights he was bound to maintain. Only Athenian citizens could be adopted, so that not only the next of kin but the whole community were interested in preventing fraudulent adoptions. With this view, registration in the *demos* of the adoptive father was requisite, in order to entitle the son to the rights of citizenship as a member of it. In Rome the adopted child assumed the name and became bound to discharge the religious duties of the adoptive father, which usually consisted in sacrifices to the *penates* or other divinities. These observances were for the most part connected with the *gens* or tribe to which the individual and his family belonged; and Savigny has even denied the existence of *sacra* peculiar to the family. A. was effected under the authority of a magistrate, the prætor at Rome, or the governor (*præses*) in the provinces. Adrogation originally required a vote of the people in the *comitia curiata*; but under the emperors it became the practice to effect it by an imperial rescript. A patrician was sometimes adrogated into a plebeian family for political purposes. Clodius, the enemy of Cicero, was so adrogated, in order that he might be eligible to a tribuneship of the people. If a father having children in his power was adopted, both he and his children passed into the power of the adoptive father. It was requisite that the adoptive father should have no children at the time, and no reasonable prospect of having any. He was also required to be older than the person adopted. Females could not be adrogated, nor, from their not sharing in the paternal power, could they adopt in any form. An opposite rule has prevailed where the institution has been received in modern times. A. was unknown to the law of the Teutonic nations; and though most of

the states of the continent have borrowed it from the Roman law, it has never existed as an institution either in England or Scotland. The patrimonial benefits of A. may, however, be conferred by deed; and there is no illegality in any one assuming the name, arms, and other distinguishing characteristics, and corresponding responsibilities, of a person who does not belong to his family. In France A. is recognized only in a very modified form.

As adoption was not possible under the common law of England, it never has obtained much recognition in law in the U. S. It was at one time authorized by the law of Louisiana, but this was changed in 1808. There are, however, special acts in some states which recognize it. There are others in which it is permitted. It is provided in Massachusetts that under a judicial decree any person may adopt the child of another as his own, and all the rights and liabilities of blood relationship will follow. In some states it must be evidenced by a written and recorded instrument. In others a judicial decree is necessary. An adopted child usually inherits from its adopting parents, and *vice versa*; but in Missouri, on the death of an adopted child, his estate goes to his blood relations.

ADORATION, an act of homage or worship among the Romans, performed by raising the hand to the mouth, kissing it, and then waving it towards the adored object. Sometimes the devotee kissed the feet or knees of the images of the gods, and Saturn and Hercules were saluted with the head uncovered. It was natural to extend to great men the A. first paid only to the deities, and Greek and Roman emperors were adored by bowing or kneeling, touching the imperial robe, and kissing the hand that did so. Eastern A. was to fall on the knees at a prince's feet, striking the forehead on the ground, and kissing the earth or floor. Such A. was refused by Conon to Artaxerxes, and by Calisthenes to Alexander the great. In England kissing the queen's hand is a form of A. The kissing the foot or slipper of the pope is the form in Rome, an example set by the emperor Diocletian; but the Roman Catholic church makes a distinction between *latría*, a worship due to God alone, and *dulia* or *hyperdulia*, the A. paid to the Virgin, saints or martyrs.

ADORNA, CATHERINE, or CATHERINE OF BOLOGNA, 1413-63; of noble descent. She was abbess of a convent in Bologna of the order of St. Clare, and was distinguished for her rapt and devout piety. It was claimed that she could prophesy and perform miracles, and a book of her *Revelations* was published in 1511. Her name is revered even among Protestants of the present day.

ADOUR, a river in France, rises near Tourmalet, in the department of the upper Pyrenees, waters in its course of 200 m. the department Gers and the fertile part of the department Landes, and enters the Atlantic below Bayonne. It receives several tributaries, and is navigable to the extent of 80 m. Bagnères-de-Bigorre, celebrated for its hot baths, is situated on the Adour.

ADOWA, a t. of Abyssinia, the capital of Tigré, 145 m. n.e. from Gondar. It is situated partly on a slope and partly at the base of a hill, on the left bank of the Hasam, a feeder of the Atbara, which is a large branch of the Nile. The houses are of the conical form common in Abyssinia, regularly disposed in streets, and mingled with gardens and trees. A. is the chief entrepôt of trade between the interior of Tigré and the coast. It has an extensive transit trade, in which gold, ivory and slaves are articles of importance. Pop. estimated at about 3500. In the vicinity of Adowa, an Italian army suffered a disastrous defeat in March, 1896, at the hands of King Menelek of Abyssinia. See ABYSSINIA.

ADRA (ancient *Abdera*), a sea-port t. of Spain, in the province of Granada, and 49 m. s.e. from Granada. It is situated on the shore of the Mediterranean, at the mouth of the Adra. The ancient Abdera, founded by the Phœnicians, was on a hill, at the base of which the modern t. stands, in a situation unhealthy on account of swamps. The port is not good, being much exposed to the w. The houses are generally of one story. There is one tolerably wide street, the rest are narrow and ill paved. From the watch-tower of A., in former times, a tocsin sounded the alarm on the approach of African pirates. Lead mines in the neighborhood give employment to many of the inhabitants and trade to the port. Among the other exports are grapes, wheat, and sugar. Pop. 9000.

ADRAS TUS, a king of Argos, contemporary of Theseus, father-in-law of Polynices, and leader of an expedition against Thebes to restore Polynices to the throne. This was the "war of the seven against Thebes," and was not successful, all the seven save A. being killed. Ten years later Thebes was captured and destroyed, in which conflict A. lost his son, and soon afterwards died of grief.

AD'RIA, in the province of Rovigo, N. Italy, is situated between the river Po and the Adigé, contains about 15,000 inhabitants, and is chiefly remarkable as being one of the oldest cities in Europe. According to tradition it was founded by the Pelasgi, 1376 B.C. In the time of the Romans, A. was one of the most frequented harbors in the Adriatic sea; but by the continual deposition of alluvium on the e. coast of Italy, it has been gradually separated from the sea, from which it is now almost 14 m. distant.

AD'RIAN, a city in Lenawee co., Mich., the co. seat, on the Raisin river and the Wabash, Lima Northern, and Lake Shore and Mich. Southern railroads. There are many factories, including furniture shops and railway repair shops. It has good banking facilities, many churches, several newspapers, public and private schools, and is the seat of Adrian college (Meth. Prot.) Pop. '90, 8756. It contains the State Industrial Home for Girls, a public library and an opera house.

A'DRIAN, Roman emperor. See **HADRIANUS**

A'DRIAN, the name of six popes, none of them very remarkable. **A. IV.** was by birth an Englishman, the only one of that nation that ever sat in the papal chair. His name was Nicholas Brakspeare. He was a native of Langley, near St. Albans, became first a lay-brother or servant in the monastery of St. Rufus, near Avignon, and in 1137 was elected abbot. His zeal for strict discipline raised a combination to defame his character, and he had to appear before Eugenius III. at Rome. Here he not only cleared himself of all charges, but acquired the esteem of the pope, who appointed him cardinal-bishop of Albano in 1146. On the death of Anastasius in 1154, he was raised to the papal see. **A.** was at first on friendly terms with the emperor Frederic I.; but his high notions of the papal supremacy, which he carried as far as even Gregory VII., led to the beginning of that long contest of the popes against the house of Hohenstaufen, which ended in the destruction of the dynasty. He was about to excommunicate Frederic, when he died at Anagni, 1159. It was in **A.**'s time that the doctrine of transubstantiation (q.v.), advanced by Petrus Lombardus, was established.

A'DRIANOPLE, the second city in the Turkish empire, was founded by the emperor Hadrian on the left bank of the navigable river Hebrus (now Maritza). The city has about 71,000 inhabitants, the half of whom are Turks. It was the scene of an important battle between the Goths and the Romans in 378 A. D. The former were victorious and broke through the Roman frontier, effecting a settlement within the limits of the Empire. The city was the capital of the Turkish sultan from 1366 to 1453. The Russian-Turkish war was here concluded, Sept. 19, 1829, by the peace of **A.**, which left the Porte in possession of Wallachia, Moldavia, and the conquests made by Russia in Bulgaria and Roumelia. On the other side, Russia got possession of the whole of the coast of the Black sea, from the mouth of the Kuban, in lat. 45° 15', to the haven of St. Nichola, lat. 42°, with the territories of the Caucasus and the greater part of the pashalic of Akalzik. After the capture of the Turkish army defending the Shipka Pass, in Jan., 1878, the Russians entered **A.** unopposed by the Turks.

ADRIATIC SEA, a large arm of the sea, extending, in a n.w. direction, between the e. coast of Italy and the w. coast of the opposite continent, being connected with the Ionian sea by the strait of Otranto. In the n. it forms the gulf of Venice, and in the n.e. the gulf of Trieste; while, on the Italian side, it forms the bays of Ravenna and Tremiti, and the narrower and deeper gulf of Manfredonia. On the other side, the coasts of Illyria, Croatia, Dalmatia and Albania are steep, rocky and barren, and begirt with a chain of almost innumerable small rocky islands. The chief bay in this side is that of Quarnero, lying s. of the peninsula of Istria. The most considerable rivers flowing into the **A. S.** are the Adigé and the Po, which are continually depositing soil on the coast, so that places once on the shore are now inland. The extreme saltness of the **A.** is probably owing to the comparatively small quantity of fresh water poured into it by rivers. Navigation in the **A.** is safe and pleasant in summer, but in winter the n.w. gales are formidable, on account of the rocky and dangerous coasts on the e. Trieste, Ancona and Sinigaglia are the chief places of commerce.

ADULE, an ancient t. on the Red sea, was the port of Axum, and is noted chiefly on account of an inscription, of some importance relative to the ancient geography of those regions, the *monumentum adulitanum*, first published, in the 6th c. in the *Topographia Christiana* of Cosmos Indicopleustes. The modern t. is called Zulla.

ADULAMITES. An attempt, in the year 1866, by the government of Earl Russell and Mr. Gladstone, to carry a measure which would have brought about a sweeping reduction of the elective franchise, gave occasion to a large number of the more moderate liberals to secede from the whig leaders, and vote with the conservatives. The designation of *Adullamites* was fastened on the new party, in consequence of Mr. Bright having, in the course of debate, likened them to the political outlaws who took refuge with David in the cave of Adullam (1 Sam. xxii. 1, 2); a comparison taken up by lord Elcho, who humorously replied that the band congregated in the cave was hourly increasing, and would succeed in delivering the house from the tyranny of Saul (Mr. Gladstone) and his armor-bearer (Mr. Bright).

ADULTERATION OF FOOD, etc. The more important adulterations will be noticed under the various articles. See also **FOOD**.

ADULTERY (Lat. *adulterium*) has been well defined as "the voluntary sexual intercourse of a married person with a person other than the offender's husband or wife." (*Bishop on Marriage and Divorce*, § 415.) By the Roman law, there was no **A.** unless the woman was married, and the same was the rule in Athens. It was in this limited form also that **A.** was recognized by the Mosaic law. By the canon law, the husband and wife were placed on the same footing; and this view has been adopted by all the nations of modern Europe. In the American state of New Jersey, it has been decided that a married man does not commit this crime in having connection with an unmarried woman. (*Bishop, ibid.*) But such has not been the prevalent doctrine even in America; and it has never been doubted that the offense necessary to found the sentence of divorce is committed by unlawful sexual intercourse equally whether the *particeps criminis* were married or single. **A.** was recognized as a crime even before Moses (*Gen.*

xxxviii. 24), and it is probable that in affixing to it the punishment of death (Lev. xx. 10), he followed the prevailing custom. A very remarkable law was introduced for the trial of A. by causing the woman suspected to drink the bitter waters of jealousy (Numb. v. 26). In Rome, the Julian law, enacted in the time of Augustus (17 B.C.) revised the previous legislation on the subject, and imposed special penalties, consisting of forfeiture of goods and banishment, both on the adulteress and the paramour. The husband, in certain cases, was permitted to kill the latter, and the father might sometimes kill both. A constitution of Constantine, the authenticity of which has been doubted, made A. a capital offense on the man's part. Whatever Constantine's law was, it was confirmed by Justinian, who further condemned the wife to be whipped, and imprisoned in a convent for the rest of her days, unless relieved by her husband within two years (*Novel*, 134, c. 10). The offense was visited in Athens with punishments closely resembling those of the earlier Roman legislation. In many continental countries, A. is still treated as a criminal offense, but in none of them does the punishment now exceed imprisonment for a limited period, which is frequently accompanied with a fine. Lord Coke says that by the law of England in early times, A. was punished by fine and imprisonment (3 *Inst.* 306). During the Commonwealth, it was made a capital offense (*Scobell's Acts*, part ii., p. 121); but this law was not confirmed at the Restoration. In Scotland, the records of the court of justiciary show that capital punishment was frequently inflicted. At the present day it is punishable in Great Britain only by ecclesiastical censure; and even this may be regarded as in desuetude. But when committed by the wife, it was regarded as a civil injury, and, till the passing of the stat. 20 and 21 Vict. c. 85 and 59, formed the ground of an action of damages for criminal conversation (commonly known as an action of *crim. con.*) by the husband against the paramour. No corresponding action was competent to the wife, either in England or America; and her only remedy consisted in obtaining a separation or divorce. In some of the United States adultery is made criminal by special law; in some it is not so recognized; in some the act itself is not a crime, but open and continued A. is. Some statutes define the crime; some only state the punishment; and this leaves a wide margin for interpretation by courts, giving rise to great diversity of opinions and decisions. Some hold that if one only of the parties be married, the other does not commit A.; some that a married man with a single woman does not commit A. because the act cannot impose spurious issue on a husband or wife. In Massachusetts, in case of a married woman and an unmarried man, the latter is deemed guilty. In New York, in such case the man does not commit A., his offense being, as in Virginia, only fornication. Connecticut and Iowa punish man and woman alike; but where no exact statute exists the general drift of opinion and decision is that a married person commits A., and an unmarried person only fornication; therefore criminal A. is the voluntary sexual intercourse of a married person with another person who is other than the proper husband or wife. Living together without marriage is hardly reckoned to be A., and seldom interfered with unless the parties are otherwise objectionable. In several states no criminal prosecution can be commenced for A. except on complaint of the husband or wife of the person charged with the offense. See DIVORCE.

AD VALOREM (Lat., according to the value). A phrase used especially in reference to the amount of duty levied on imports, i. e., a certain per cent. on the value. In the tariff act of 1890, ad valorem duties were not as frequent as formerly, but a duty laid on the pound, bushel, or ton prevailed more largely. In some cases, notably in woolen goods there was a combination of both kinds of duty.

ADVANCEMENT, in law, a gift by a parent to an heir, of all or a portion of that which he or she would be entitled to upon arriving at a certain age, or upon the death of the advancer. An A. is legal only from a parent to a child. Any such gift is presumptively an A., but the contrary may be shown. No regular form of an A. is needed. An A. has the effect of reducing by its amount the distributive portion that would come to the receiver.

ADVANCEMENT OF SCIENCE, ASSOCIATIONS FOR THE, well-known bodies of scientific men, especially in Great Britain and the United States. The English body was organized in 1831, under the lead of David Brewster, and in three years grew from 100 to 1400 members; its annual transactions form volumes of about 500 pp. each. The American association originated in 1847 at Boston, and was organized by geologists chiefly; but now embraces almost every prominent scientific man in the country. The association meets annually, changing its place from city to city. Yearly reports are published. See BRITISH ASSOCIATION.

ADVENT, or Time of Advent (Lat., the approach or coming), a term applied, by the Christian church, to certain weeks before Christmas. In the Greek church, the time of A. comprises forty days; but in the Roman church, and those Protestant churches in which A. is observed, only four weeks. The origin of this festival, as a church ordinance, is not clear. The first notice of A., as an appointment of the church, is found in the synod of Lerida (524 A.D.), at which marriages were interdicted from the beginning of A. until Christmas. The four Sundays of A., as observed in the Romish church and the church of England, were probably introduced into the calendar by Gregory the great. It was common from an early period to speak of the coming of Christ as *fourfold*: his "first coming in the flesh;" his coming at the hour of death to receive his faithful followers (according to the expressions used by St. John); his coming at the fall of Jerusalem (Matt. xxiv. 30); and at the day of judgment. According to this fourfold

view of A., the "gospels" were chosen for the four Sundays, as was settled in the western church by the *Homiliarum* of Charlemagne. The festival of A. is intended to accord in spirit with the object celebrated. As mankind were once called upon to prepare themselves for the personal coming of Christ, so, according to the idea that the ecclesiastical year should represent the life of the founder of the church, Christians are exhorted, during this festival, to look for a spiritual advent of Christ. The time of the year when the shortening days are hastening towards the solstice—which almost coincides with the festival of the Nativity—is thought to harmonize with the strain of sentiment proper during A. In opposition, possibly, to heathen festivals, observed by ancient Romans and Germans, which took place at the same season, the Catholic church ordained that the four weeks of A. should be kept as a time of penitence; according to the words of Christ: "Repent, for the kingdom of heaven is at hand." During these weeks, therefore, public amusements, marriage festivities and dancing were prohibited, fasts were appointed, and sombre garments were used in religious ceremonies. The Protestant church in Germany has also abstained from public recreations and celebrations of marriage during A. It was perhaps a natural thought to begin the ecclesiastical year with the days of preparation for the coming of Christ. This was first done by the Nestorian church in the east in the 6th c.; the example was soon followed in Gaul, and afterwards became general throughout the west.

ADVENTISTS, a denomination of Christians numbering in the United States and Canada about 100,000. In the early years of the 19th century many clergymen, among whom may be mentioned Edward Irvine of England, William Miller of New York, Joshua V. Himes of Massachusetts, John Couch of New Hampshire, Miles Grant of Boston, S. G. Mathewson of Connecticut, Josiah Litch, Joseph Wolf, Prof. N. N. Whiting and others, began to preach the second coming of Christ as being near, from the signs of the times and the fulfilment of the prophecies. They were followed by many earnest advocates and enthusiastic persons who taught the same views. Mr. Miller in his chronological calculations from the prophecies, thought that Christ would come about the year 1843. In this Mr. Miller and his followers were sadly disappointed. The denomination does not now fix upon any definite date for the day of judgment to come but regards it as being near at hand. The Advent Christian denomination has organized churches and conferences in nearly all of the States, and in the provinces of Canada. They have several publishing houses, from which are issued weekly papers, books, tracts and other periodicals. The Advent Christian Publication Society of Boston issues weekly a large prophetic journal of 16 pages entitled the *World's Crisis*, which is the leading paper of the denomination. The Western Publishing Association at Mendota, Ill., issues a weekly paper of 16 pages, entitled *Our Hope*, as well as other religious literature. This Publishing Association has under its control Mendota College, at Mendota, Ill. The Pacific Publishing House, of Oakland, Cal., issues weekly the *Messiah's Advocate* and other publications. The American Advent Mission Society, incorporated in 1866, is doing very active work. The Advent Christian Association and General Conference of America was organized in 1860 and holds biennial sessions. It is composed of delegates from all the state conferences and provinces. The denomination in 1897 had 1500 ministers ordained and licentiate.

ADVENTISTS, SEVENTH DAY, organized about 1844; they set no date for Christ's second advent. They are known chiefly in Michigan, where they have a publishing association; and they have sent missions to several countries in Europe, Africa and Australia. At the general conference in 1877 they resolved that "the highest authority under God among seventh day adventists is found in the will of the body of that people, as expressed in the decisions of the general conference when acting within its proper jurisdiction." In 1896 they reported 256 ministers and licentiates, 1258 churches, and 45,109 members.

ADVERB. As an adjective is joined to a noun, so is an A., for analogous purposes, to a verb, an adjective, or another A. From the frequency with which adverbs are joined to verbs, they get their name. An A. cannot be the subject, the copula or the predicate of a proposition; and is, therefore, a secondary part of speech, logically speaking. According to their signification, adverbs may be divided into—1. Adverbs of place, as *where, towards*; 2. of time, as *ever, immediately*; 3. of degree, as *very, almost*; 4. of manner, as *thus, wisely*; 5. of belief or doubt, as *perhaps, no*, etc.—It is commonly said that "some adverbs admit of comparison;" as if in this respect they differed from adjectives. The truth is that adverbs admit of comparison under the same limitations, neither more nor less, that restrict the comparison of adjectives. Thus, *soon* is compared as naturally as *hard*. If *now* or *thus* cannot be compared, neither can *wooden* nor *circular*; and in both cases for the same reason—the sense forbids it. The laws of euphony prevent alike *miserable* and *miserably* from being compared grammatically, i.e., by the addition of *er* and *est*; but both admit of logical comparison by the use of *more* and *most*.—A large class of adverbs in English are formed from adjectives by annexing the syllable *ly*, which is just the word *like*. Most languages have some such means of distinguishing the A. from the adjective, except the German, in which they are alike. Adverbs in general may be looked upon as abbreviations of phrases; thus *here* = *in this place*, *then* = *at that time*, *wisely* = *like a wise man*. Combinations of words that can thus be represented by a single adverb, and all combinations that are analogous, though they may have no single word equivalent to them, are called adverbial expressions.

ADVERTISEMENT (Fr. *avis*), the public notification of a fact. This is now commonly effected by means of the ordinary newspapers, or of newspapers, printers' lists and other publications specially devoted to the purpose. Advertisements, both printed and written, are still posted conspicuously in public places, in which case they are commonly called bills or placards. In England, the most formal kind of A., and that which is employed in the case of royal proclamations and the like, is publication in the *Gazette* (q.v.); but so little is the *Gazette* read by private persons, that, as regards the customers, publication in it alone is not a sufficient notice of a dissolution of partnership to free the partners from debts afterwards contracted in name of the company. Public notifications are frequently enjoined by statute; as, for example, under road and bridge acts, the bankrupt statutes, etc. In many other ways their legal effects are important. Advertisements by public carriers, railway companies, and the like, are equivalent to offers whereby the advertiser will be bound to those who send goods on the faith and in accordance with the terms of the A. By advertising a *general ship*, for a particular voyage, the master places himself on the footing of a public carrier, and is bound to receive goods for the port to which the vessel is advertised to sail. A merchant in such circumstances can insist on his goods being received, unless the ship be full, or the entire freight engaged. The contract of affreightment is completed by the A., and the shipping of the goods in conformity and with reference thereto. In the United States, advertising has grown to a very surprising extent within two or three decades, and is still growing, not only in the newspapers, but in boats, railway cars, and public buildings. Fences, rocks, and trees are covered with print and paint. So much was this the case along routes of travel that some years ago the legislature of N. Y. enacted a law against defacing natural scenery by such devices, and the advertisers then hired vacant spaces on conspicuous walls. The shower of advertisements in the shape of small handbills is incessant, and they are put into one's hands at every step, at church doors and in hotels, in public vehicles, thrust under private doors, and sent by millions through the mails. Large boats bearing on their sails huge advertisements sail up and down all the season before a crowded watering-place, and now and then a rain of advertisements comes from a wandering balloon. When daylight fails the magic lantern throws advertisements on large screens in conspicuous places in N. Y. and other cities. The eye and the ear are attacked by the indefatigable advertiser, and music, chord and discord, horns, bells, gongs and yells are used. In legitimate newspapers the progress of advertising has been wonderful. About forty years ago an advertising agency was started in N. Y. and barely lived for the first dozen years; now such establishments are counted by scores, and some of them do business amounting to many hundred thousand dollars in a year. The city papers that in 1850 were of four pages of six columns each are now of eight, twelve, sometimes twenty pages, of which more than half the space is taken up by advertisements. One paper receives more money now for one week's advertisements than it did from that source in the first three years of its existence, which period was about forty years ago. It has printed eighty columns and nearly 4000 new advertisements in a single issue. Prices of advertising vary widely, graded if at all by the character as well as the extent of circulation, and by position in the paper. Rates may be generally stated at from two dollars down to twenty cents a line in city papers of large or fair circulation. The highest prices are for the news column, or for a notice that appears to be the voluntary statement of the journal. In the matter of "wants," those who want occupation are charged half rates or less, while employers pay about 40 cents a line, and the latter rate is the highest for the greater portion of regular advertisements. The extent and apparent extravagance of American advertising astonishes Europeans. Not long ago one publisher would take a whole page on a given day of each of four or five city papers, in which he would repeat over and over again a single announcement that occupied only four or five lines. The cost to him was enormous, but he testified that it was a judicious outlay, for the mere notoriety of such prodigal expenditure led people to inquire about him, and his publication (a literary newspaper) speedily rose from a few thousands to more than a quarter of a million of copies a week. Odd forms of beginning advertisements are not new, and are not so popular as they were a few years ago. Some journals debar pictures and very large type, and business announcements are usually plain and practical. It is impossible to learn the extent of the business. Some houses and companies do an immense amount, and some very little; but in general trade, such as dry goods, those who do the most business are the largest advertisers. For notice of meetings, lectures, amusements, the opera or the play of the night, for time of boats, trains, etc., the public in cities depend almost entirely upon the advertising columns of the morning and evening newspapers. When there was a duty of 3 per ct. on receipts for advertisements, in 1867, N. Y. city publishers paid \$80,000, representing about \$2,700,000 received for advertisements during the year. See Sampson's *History of Advertising*. See **NEWSPAPERS**.

ADVERTISEMENTS OF ELIZABETH was the name of a book of discipline issued by Archbishop Parker in 1566, having for its object the establishment of "due order in the public administration of Common Prayer and using of Holy Sacraments" and prescribing the apparel of all ecclesiastical persons. It enforced the wearing of surplice and cap, and generally demanded rigid obedience to those more objectionable portions of the Act of Uniformity, which had not been strictly applied. The archbishop

desired an official promulgation of the book, but Cecil refused to lend himself to the cause of Puritan persecution, and Parker issued the Advertisements upon his own responsibility. Considerable controversy has arisen with regard to their validity, some holding, with Lord Selborne in the Ridsdale case, that the royal authorization gave them binding force, while others adopt the view of Mr. J. Parker in "Ornaments Rubric," that the Advertisements are simply archiepiscopal injunctions.

ADVICE. See BILL OF EXCHANGE.

ADVOCATE (Lat. *advocatus*). An A. is generally defined "the patron of a cause," though it does not appear that the "patrons" who, in ancient Rome, assisted their clients with advice and pleaded their causes, were ever called by that name. Even in the time of Cicero, the term *advocatus* was not applied to the patron or orator who pleaded in public, but rather, in strict accordance with the etymology of the word, to any one who in any piece of business was called in to assist another. There can be no doubt, however, that the forensic orators and jurisconsults of the later period of the republic, who followed law as a profession, and received fees (*honoraria*) for their services, occupied a position closely analogous to that of the A. of modern times, and thus it has been said that the profession is older than the name. The occupations of a jurisconsult and a forensic orator seem to have differed pretty much as those of a consulting and a practicing counsel do with us. They might be exercised separately, but were generally combined; and thus Cicero speaks of his master, Scævola, as "the most eloquent of the learned, and the most learned of the eloquent" (*jurisperitorum eloquentissimus, eloquentium jurisperitissimus, De Or.*, i. 39). Ulpian defined an A. to be any person who aids another in the conduct of a suit or action (*Dig.* 50, *tit.* 13), and in other parts of the digest it is used as equivalent to an orator (see also Tacit. *Annal.*, x. 6), so that the word would seem gradually to have assumed its modern meaning. The office of the A. or barrister who conducted the cause in public was, in Rome, altogether distinct from that of the procurator, or attorney or agent, who represented the person of the client in the litigation, and furnished the A. with information regarding the facts of the case. The distinction between these two occupations is still observed in Great Britain, but in many of the states of Germany, in Geneva, in the United States, and in some of the British colonies, as, for example, in Canada, they are united in the same person. In England and Ireland, advocates are called *barristers*, under which title will be found a statement of the duties and responsibilities which the A. undertakes to his client, and of the state of the profession in these countries. In Scotland, as in France, the more ancient name has been retained.

In France, the *avocat* and *avoué* correspond very nearly to the barrister and attorney in England. The advocates do not form a corporation, in the technical sense, but are a free society or association (*ordre*), which has the power of protecting its members, and of exercising internal surveillance and discipline over them. Neither do they exercise any ministerial functions like those which public authority has conferred, under certain conditions and responsibilities, on *avoués* and notaries. The French A. is simply a free man, who has graduated in law, and possesses the privilege of addressing the tribunals. The advocates who practice in each court form a separate college, admission to which can be obtained only with the approval of those who are already members. Enrollment in the books of the college does not confer the title of A., for this title belongs to every licentiate who has taken the oaths before a court; but it gives the right of communicating (*droit de communiquer*) with the other members of the body, without which the exercise of the profession would be impossible. As a necessary consequence of this arrangement, erasure of the name of any individual from the list is equivalent to a prohibition to practice. The French A. possesses the same privileges as to irresponsibility for his advice, and for the facts contained in his instructions, which belong to members of the corresponding branch of the legal profession in Great Britain. As he has no action for his fees, they are required to be paid in advance. His functions correspond to those of the counselor-at-law in the U. S. The French advocates have, on several occasions, resisted, as an encroachment on their privileges, the attempt to compel them to grant receipts for their fees. It further belongs to the etiquette of the bar of France that, in communicating articles of process to each other, no acknowledgment shall be exchanged; and we are told, with honest pride, that during the many centuries that this custom has existed, not one single instance of its abuse has occurred.

In Belgium, in Geneva, and also in those of the German states by which the code Napoleon has been received, the organization and discipline of this branch of the legal profession are similar to those which prevail in France. In the other German states, with the exception of Saxony, the formation of the advocates into a body has been perseveringly resisted by the governments.

ADVOCATE, LORD, called also king's or queen's advocate, is the public prosecutor of crimes in Scotland, senior counsel for the crown in civil causes, and a political functionary of great importance in the administration of Scottish affairs. He may issue warrants of arrest and imprisonment in any part of Scotland, is entitled to plead within the bar, and possesses many other discretionary and indefinite powers. He is a member of parliament and as first law-officer of the crown for Scotland, is expected to answer all questions relating to the business of Scotland, and to take the superintendence of legislation for that portion of the United Kingdom.

ADVOCATUS DIABOLI, the devil's advocate. In the Roman church, when it is proposed that a deceased person shall be canonized, an examination of his past life takes place. In this process, one party holds the office of accuser, or *advocatus diaboli*; and it is his duty to bring forward all possible objections against the proposed canonization; while, on the other side, the *Advocatus Dei* (God's Advocate) undertakes the defense. Hence the term A. D. has been applied to designate any person who brings forward malicious accusations.

ADVOWSON. The right of presentation to a church or ecclesiastical benefice in England. Advowsons are either *appendant* or *in gross*. Lords of manors were originally the only founders, and, of course, the only patrons of churches; and so long as a right of patronage continues annexed or appended to the manor, it is called an A. appendant. Such rights are conveyed with the manor as incident thereto, by a grant of the manor only, without adding any other words. But where the property of the A. has been once separated from the property of the manor by legal conveyance, it is called an A. *in gross*, or at large, and is annexed to the person of its owner, and not to his manor or lands. Advowsons are further divided into *presentative*, *collative*, or *donative*. The first is where the patron has the right of presentation to the bishop or ordinary, and may demand of him to institute his clerk, if he find him canonically qualified. This is the most usual A. The second or collative A. is where the bishop and patron are one and the same person. In this case, the bishop cannot present to himself, but he does by the one act of collation the whole that is done in common cases by both presentation and institution. The third or donative A. is when the sovereign, or a subject by his license, founds a church or chapel, and ordains that it shall be at the sole disposal of the patron, subject to his visitation only, and not that of the ordinary, and vested in the clerk by the patron's deed of donation, without presentation, institution, or induction.

ÆACUS, the fabled son of Jupiter and Egina, and king of Egina; father of Telamon and Peleus. He was so renowned for justice that not only men, but the gods, sought for his decisions. After death, Pluto made him one of the judges in Hades.

ÆDILES, Roman magistrates, who had the care of public buildings (*ædes*), especially the temples, and also attended to the cleansing and repairing of the streets, the preparations for funerals, public games and spectacles, the inspection of weights and measures, the regulation of markets, etc.—At first there were only two Æ., who were chosen from the plebeians, and styled Æ. *plebis*; afterwards, two others, styled Æ. *curules*, were chosen from the patricians (366 B.C.), and Julius Cæsar appointed a new order of Æ. *cereales* to take charge of the public granaries.

ÆDUI, or HEDUI, a people of Celtic Gaul, between the Saône and Loire. They were the first Gallic tribe that joined in the alliance against the Romans, who had relieved them from a German tyrant. They fought against Julius Cæsar, but were overthrown. Bibracte (now Autun in Burgundy) was their chief town.

ÆGEAN SEA. See ARCHIPELAGO.

ÆGINA, now written Egina, an island forming part of the kingdom of Greece, of about 40 sq.m. in area, in the ancient Saronicus Sinus, now the gulf of Egina. It is mountainous, with deep valleys and chasms; and the coast affords only one haven on the n.w. The modern t. of Egina stands on the site of the ancient t., at the n.w. end of the island. The island contains about 7000 inhabitants, who are chiefly occupied in trade, navigation and agriculture. The soil produces the best almonds in Greece, with wine, oil, corn and various fruits. Partridges abound in such numbers that the people find it necessary to thin them by destroying their eggs. The most ancient name of the island was Ænone, and, according to tradition, the Myrmidons dwelt in its valleys and caverns. In ancient times, the people of Æ. had considerable importance in Greece; and their fleet distinguished itself for valor in the battle of Salamis. Their prosperity excited the envy of the Athenians, who made the island tributary, and afterwards expelled altogether the original inhabitants. The language, manners, and style of art among the ancient people of Æ. were Dorian.

ÆGINE TA, PAULUS, a surgeon of the island of Ægina, probably in the 7th c. He was a man of great knowledge, and left a synopsis of medicine, in seven books, of which the one on surgery is particularly interesting. He was the first writer to notice the cathartic properties of rhubarb, and the first physician who deserved the title of accoucheur.

ÆGINE TAN SCULPTURES. The small island of Ægina holds an important position in the history of Grecian art. A severely natural character belongs to its works of sculpture, of which several have been discovered in modern times. On an eminence in the eastern part of the island stand the ruins of a temple, usually called the temple of Jupiter Panhellenius, but now believed to have been a temple of Pallas or Minerva. Among these ruins a series of statues were excavated by a company of Germans, Danes and Englishmen, which, in 1811, were purchased by Louis, then crown-prince of Bavaria, and are now the most remarkable ornaments of the Glyptothek at Munich. They are of various heights, and were evidently intended to decorate the tympana of the temple beside which they were found. The group that seems to have been designed for the hinder tympanum is superior in preservation, and represents a combat of Greeks and Trojans for the body of a fallen hero. The other group is the contest of Telamon with Laome-

don. The figures are true to nature, as in the old Greek style, with the structure of bones, muscles, and even veins, distinctly marked; but the faces have that unpleasant, forced smile which is characteristic of all sculpture before the time of Phidias.

ÆGIR (Anglo-Sax., *eager*, "the sea"), a Norse god, presiding over stormy oceans, who entertains the gods in harvest time. The name survives in England, where a sudden wave or "bore" running into a river from the sea is called an *eygre*, or *eager*.

ÆGIS, the shield of Jupiter, which had been fashioned by Hephæstus (Vulcan). When Jupiter was angry, he waved and shook the Æ., making a sound like that of a tempest, by which the nations were overawed. The Æ. was the symbol of divine protection, and became, in course of time, the exclusive attribute of Jupiter and Minerva.

ÆGISTHUS, a king of Mycenæ, adopted son of Atreus. He was a cousin of Agamemnon, whose wife, Clytemnestra, he seduced, and he was slain by Agamemnon's son Orestes. If Greek writers are to be believed, the family relations of Ægisthus were abominable.

ÆGIUM, an ancient city of Greece, for a time the chief city in the Achæan league. It was on the Salinus river. In Aug., 1817, an earthquake destroyed more than half of the houses of the modern town.

ÆGLÉ, a genus of plants of the natural order *aurantiaceæ* (q.v.), distinguished by a five-toothed calyx, linear elongate mucronate anthers, and a many-celled fruit. *Æ. marmelos*, the tree which produces the *bhel* fruit of India, has ternate, petiolate, ovato-oblong leaves, and the flowers in panicles. It is found from the s. of India to the base of the Himalaya mountains. The fruit is delicious, fragrant and nutritious. In an imperfectly ripened state it is an astringent of great effect in cases of diarrhea and dysentery, and as such has lately been introduced into English medical practice. The root, bark and leaves are also used as medicinal. The Dutch in Ceylon prepare a perfume from the rind of the fruit, and the mucus of the seed is employed as a cement for many purposes.

ÆGOSPOTAMI, or **ÆGOSPOTAMOS** (Gr. goat-river), in the Thracian Chersonese, is famous for the defeat of the Athenian fleet by the Lacedæmonians under Lysander, which put an end to the Peloponnesian war and to the predominance of Athens in Greece, 405 B.C.

ÆGYPTUS, son of Belus, brother of Danaus, and king of Arabia, who conquered the region to which he gave the name Egypt. The poetic legend was that he had fifty sons, all but one of whom, Lynceus, were murdered by the same number of daughters of Danaus, whom they had married. See **DANAUS**.

ÆLFRIC, or **ALFRIC**, a distinguished Saxon ecclesiastic of the 10th c., regarding whose age, writings, and personality even, there has been a great difference of opinion amongst antiquaries. He appears to have been the son of the ealdorman or earl of Kent; but early manifesting a devotional spirit, he entered the monastery of Abingdon, the members of which belonged to the Benedictine order. Towards the close of the 10th c., he became a priest in the cathedral of Winchester. He was next appointed abbot of St. Albans, then bishop of Wilton, and finally archbishop of York, although others appear to think him that Æ. who was archbishop of Canterbury. Æ., archbishop of York, died in 1050; Æ., archbishop of Canterbury, in 1005. The writer Æ., whether of York or of Canterbury, was a man of superior attainments for his time, of excellent character, and one whose religious convictions were less disfigured by superstition than those of his contemporaries. The principal works ascribed to Æ. are—1. A Latin and Saxon glossary, printed at Oxford in 1659; 2. A Saxon version of most of the historical books of the Old Testament; 3. A charge to his clergy; 4. Two volumes of Saxon homilies; 5. A Saxon grammar in Latin.

ÆLIA CAPITOLINA, the name given to Jerusalem by Hadrian, who expelled the Jews for rebellion, and colonized the city with Romans. The name continued until the time of the Christian emperors.

ÆLIA NUS, **CLAUDIUS**, an Italian writer early in the 3d c. His works are *Varia Historia* and *De Animalium Natura*, and are written in Greek.

ÆLOTROPY, from Greek words meaning "changeful" or "turning," signifies that change which takes place in the physical properties of a body, caused by change of position, e.g., the refractive property of a transparent body is not the same in all directions. The ælotropy of Iceland spar is a fine illustration of this. Ælotropy is the opposite of isotropy (q.v.).

ÆMILIAN PROVINCES. See **EMILIAN PROVINCES**.

ÆMILIUS PAULUS. The most remarkable of this name was the son of the consul Æ. P., who fell in the battle of Cannæ, 216 B.C. Young Æmilius inherited his father's valor, and enjoyed an unwonted degree of public esteem and confidence. In 168 B.C. he was elected consul for the second time, and intrusted with the war against Perseus, king of Macedon, whom he defeated in the battle of Pydna. During the war, his two younger sons died; and Æ. is said to have thanked the gods that they had been chosen as victims to avert calamity from the Roman people.

ÆNEAS, the hero of Virgil's *Æneid*, was, according to Homer, the son of Anchises and Venus, and was ranked next to Hector among the Trojan heroes. The traditions of

his adventures before and after the fall of Troy are various and discordant. Virgil gives the following version: Æneas, though warned by Priam in the night when the Greeks entered Troy, to take his household gods and flee from the city, remained in the contest until Priam fell, when, taking with him his family, he escaped from the Greeks, but in the confusion of his hasty flight, lost his wife Creusa. Having collected a fleet of twenty vessels, he sailed to Thrace, where he began building the city of Ænos, but was terrified by an unfavorable omen, and abandoned his plan of a settlement here. A mistaken interpretation of the oracle of Delphi now led him to Crete; but from this place he was driven by a pestilence. Passing the promontory of Actium, he came to Epirus, and then continued his voyage to Italy and round Sicily to the promontory of Drepanum on the w., where his father, Anchises, died. A storm afterwards drove him to the coast of Africa, and landing near Carthage, he was hospitably received and entertained by queen Dido. His marriage with Dido was prevented by Jupiter, who sent Mercury with a command that Æneas must return to Italy. Accordingly, he sailed away, leaving the disappointed queen, who committed suicide. During his stay in Sicily, where he celebrated the funeral of his father, the wives of his companions and seamen, weary of long voyages without certainty of finding a home, set fire to his fleet. After building the city Acesta, he sailed for Italy, leaving behind him the women, and some of the men belonging to his fleet. On landing in Italy, he visited the Sibyl at Cumæ, and received intimations of his future destiny. Then, sailing along the Tiber, and landing on the e. side of the river, he found himself in the country of Latinus, king of the Aborigines. Lavinia, the daughter of Latinus, had been destined to marry a stranger; but her mother had promised to give her in marriage to Turnus, king of the Rutuli. A war ensued, which terminated in the marriage of Æneas with Lavinia. Their son, ÆNEAS SYLVIVS, as the ancestor of the kings of Alba Longa, and also of Romulus and Remus, was regarded as the founder of the Roman empire. It is hardly necessary to add that all these statements are merely mythical, having no historical basis. See **ROME**.

ÆNEAS SILVIUS. See **PIUS II.**

ÆNIA NES, a tribe of upper Greece of uncertain origin, noticed by Plutarch. They made many migrations. Their chief t. was Hypata, remains of which exist at Neopatra. They are said to have belonged to the Amphycionian council, and to have joined the confederacy against Macedonia; but Strabo says that at this time they had no existence.

ÆOLIAN HARP, a very simple musical instrument which produces harmonic sounds when placed in a current of wind. It is formed by stretching eight or ten strings of cat-gut, all tuned in unison, over a wooden shell or box, made generally in a form sloping like a desk. The sounds produced by the rising and falling wind, in passing over the strings, are of a drowsy and lulling character, and have been beautifully described by the poet Thomson, as supplying the most suitable kind of music for the *Castle of Indolence*.

ÆOLIAN ISLES. See **LIPARI ISLANDS.**

ÆOLIANS, one of the principal races of the Greek people, who were originally settled in Thessaly, from which they spread and formed numerous settlements in the northern parts of Greece and in the w. of Peloponnesus. In the 11th c. B.C., some part of them emigrated to Asia Minor, where they founded, on the n.w. coast in Mysia, and the adjacent isles, more than thirty cities; among them Smyrna, and Mitylene in the island of Lesbos, where the Æolian dialect of the Greek language chiefly developed itself in the forms employed in the poetry of Alcæus and Sappho. The Æolian shared the fate of the other Grecian colonies in Asia Minor. First oppressed by the Lydian kings, then deprived of their independence by the Persians, they became a portion of the great empire founded by Alexander, and, passing through a stage of subjection to the dynasty of the Seleucidæ, were ultimately absorbed in the Roman empire.

ÆOLIPYLE, or **ÆOLIPILE** a hollow metal ball with one or two inner tubes curved in opposite directions and connecting with surface orifices. Used, when filled with water or alcohol, to show the force of steam, or as a blow-pipe for lamp flame. The ancients thought it illustrated the origin of winds; hence the name, from *æobus* and *pila*, a "ball."

ÆOLIS, district of Asia Minor, on the coast of Mysia, including Troas to the shore of the Hellespont. In the s. part there were twelve cities which formed the Æolian league; of them, Cyne and Smyrna were the most famous.

ÆOLUS, son of Hellen, brother of Dorus, and father of Sisyphus. He ruled over Thessaly, and is said to have been the founder of the Æolic branch of the Greek race.

ÆOLUS, god of the winds; a favorite of Juno. He was supposed to dwell in a vast cave in the Æolian islands, keeping the winds in bags, and letting them out as demanded by Neptune.

ÆON, a Greek word signifying an age, and also eternity. The Gnostics spoke of Æons, in a peculiar sense, as powers that had emanated from God before the beginning of time, and existed as distinct entities or spirits. They were called Æons either as partaking of the eternal existence of God or because they were thought to preside over the various ages and transformations of the world. See **GNOSTICS**.

ÆPINUS, **FRANZ ULRICH THEODOR**, 1724-1802: a descendant of Johann; professor of medicine and natural philosophy; experimenter in electricity, and inventor of the electric condenser and electrophorus. He wrote a work to establish a new theory of

electricity, endeavoring to subject its phenomena to mathematical analysis. Catherine II., empress of Russia, made him teacher to her son Paul, and inspector-general of the normal schools which she proposed to establish. He discovered the electric properties of tourmaline.

ÆPINUS, JOHANN, 1499–1553; a German Protestant divine, a disciple of Luther, in whose behalf he suffered arrest, although he had the most influence of any divine in n. Germany. He was a pastor in Hamburg, and one of the signers of the articles of Schmalkalden; was the author of polemical books, and was moderately upheld by Melancthon.

ÆQUI, an ancient warlike tribe of central Italy; obstinate enemies of the early Romans, against whom they made alliances with the Volsci. They were defeated by Camillus, 389 B.C., and soon afterwards were quite subdued. Mt. Algidus was one of their strongholds, whence they raided on Rome.

ÆRIANS, a class in Rome having no social position now definable, and having no civil rights beyond the mere protection of the state. For bad conduct any citizen might be degraded to this condition, but not for life. Persons declared infamous became of this class, and it probably included itinerant retail merchants. They were taxed, but were not subject to military service.

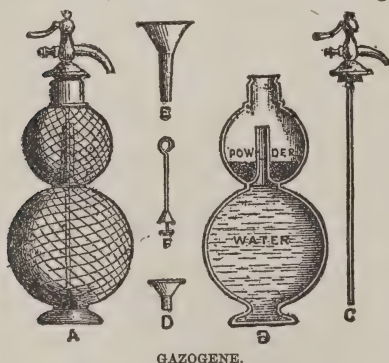
ÆRIUM, the public treasury of ancient Rome, containing the money and accounts of the states, the standards of the legions, the public laws engraved in brass, the decrees of the senate, and other documents of importance. The temple of Saturn was the place of deposit. Besides this common treasury, replenished by general taxes and charged with ordinary expenditures, there was a reserve treasury, maintained by a tax of 5 per cent on the value of manumitted slaves, which was not to be resorted to or ever entered except in extreme necessity. In addition to the treasuries, the emperor had a “*fiscus*,” or separate exchequer. Augustus established a military treasury to contain all money for the maintenance of the army. Later emperors had separate private *Æ.*, containing the moneys appropriated to their private use.

ÆRATED BREAD is prepared by a process which insures rapidity of manufacture, purity, cleanliness and the prevention of waste. In ordinary bread-making, wheat-flour is moistened with water and worked into dough, to which common salt and yeast are added. The latter causes the flour to ferment or decompose, when carbonic acid is given off at every part; and when the fermented dough is placed in an oven, the bubbles of carbonic acid gas expand, and cause the formation of the spongy mass characteristic of good loaf-bread. The process of preparing A. B. consists in placing the flour in a strong inclosed iron box, and moistening it with carbonic acid water, prepared as stated under A. **WATERS**. The dough is then worked up by machinery for ten minutes or so inside the box, from which it is dropped into molds, which form it into loaves. It is then placed in an oven, when the carbonic acid, previously introduced with the water within the dough, expands, and forms a light palatable bread. The advantages which this method of working bread possesses are—1. There is a saving of the whole of the waste caused by fermentation, which admits of more bread being made out of a sack of flour than by the old process. 2. The process, instead of occupying eight or ten hours, is completed in half an hour. 3. The cost of machinery and gas is less than that of yeast used in the old process. 4. The dough requires no handling to knead it and form it into loaves. 5. The bread is absolutely pure—it is simply flour, water and salt. Finally, should the whole of the bread in the kingdom be thus made, a very considerable saving would be effected in the consumption of flour.

ÆRATED WATERS are employed largely as refreshing, refrigerant beverages to allay thirst during warm weather, and during feverish conditions of the animal frame. The

most common A. beverage is *carbonic acid water*, generally spoken of as *soda-water*, though it seldom contains any soda. It is prepared on the large scale by placing whitening, chalk, or carbonate of lime (CaCO_3) in a lead vessel with water and sulphuric acid (H_2SO_4), when the sulphuric acid combines with the lime to form *stucco* or sulphate of lime (CaSO_4), and carbonic acid (CO_2) is evolved as gas. The latter is received in a reservoir, and is thereafter forced into water, so that the latter dissolves about five times its own volume of the gas. The water then constitutes a brisk sparkling liquid, with a pungent but pleasant acidulous taste. On the small scale, and for family use, carbonic acid water may be conveniently prepared in the apparatus known as the *gazogène* or *seltzogenè*.

The complete apparatus is seen at A, and dissected at B and C. In proceeding to use the vessel, the lower globe at B is filled with water by means of the long funnel



GAZOGÈNE.

E, taking care that no water runs into the smaller and upper division. The powders, consisting of bicarbonate of soda (NaHCO_3) and tartaric acid ($\text{C}_4\text{H}_6\text{O}_6$), are then placed in the upper globe by means of the small funnel D, and care is taken, by plugging up the tube communicating with the lower part by the stopper F, that no powder passes into the larger globe. The long tube, C, is then inserted into the globes, and screwed well in. The apparatus is inclined till water from the lower globe enters and fills the upper globe about one third; then it is placed erect, and allowed to be at rest for two hours, when, if the screw stop-cock at the upper part be opened, the carbonated water will flow out readily into any vessel placed to receive it. The explanation of the action which goes on in the vessel is that tartaric acid and bicarbonate of soda have no action on each other so long as they are dry; but whenever water is admitted, the tartaric acid combines with the soda to form tartrate of soda and water ($\text{Na}_2\text{C}_4\text{H}_4\text{O}_6$), and at the same time carbonic acid (CO_2) is given off, and descending the tube into the lower globe, dissolves in the water contained therein. Occasionally, bisulphate of potash is used instead of the tartaric acid, to save the greater expense of the latter.—The gazogènes can likewise be used in the preparation of true soda-water, or *eau de vichy*, by adding a little carbonate of soda to the water in the lower globe before charging with carbonic acid. A *wine* may be obtained by placing white wine with a little sugar-candy in the lower globe instead of water. *Sparkling lemonade* is procured when the carbonic acid water is run into a tumbler containing a little syrup of sugar; and A. *fruit-beverages*, when the water charged with carbonic acid is received in a glass containing about a table-spoonful of any of the fruit-syrups.

The less common A. W., prepared on the large scale, are—1. A. *soda-water* (true soda-water), obtained by adding 15 gr. of crystallized carbonate of soda to each bottle before it is charged with the carbonic acid water; 2. A. *potash-water*, by employing in a similar way 20 gr. of bicarbonate of potash; 3. A. *setters-water*, when carbonate of soda and chloride of sodium (common salt) are dissolved in carbonic acid water; 4. A. *carrara-water*, when finely divided Carrara marble is dissolved in the acid-charged water; 5. A. *lime-water*, when other forms of lime than the Carrara marble are used; 6. A. *magnesian-water*, when magnesia, or the carbonate of magnesia, is used; and A. *chalybeate-water*, when a compound of iron is dissolved in the carbonic acid water. The latter beverage has lately been employed in medicine, as an easy means of introducing iron into the blood, and with good effect. A. Carrara and lime waters are now administered in cases where the bony structure requires to be strengthened, and A. magnesia-water is a very agreeable mode of giving a patient a dose of magnesia. The well-known effervescing draughts called *soda-powders* and *seidlitz-powders* are two other kinds of A. drinks. In the former, bicarbonate of soda and tartaric acid are added to water in a tumbler, and a refreshing draught instantaneously prepared. *Seidlitz-powders* contain tartrate of soda and bicarbonate of soda in one paper, and tartaric acid in the other; and when both are added to the water, effervescence ensues, and the liquid is then partaken of.

A. W. likewise occur naturally. Water, as it is drawn from a spring, tastes differently from the same water after being boiled and cooled; and this is due to the unboiled water containing the gases oxygen, nitrogen and carbonic acid—especially the latter—dissolved in it. Spring-water is therefore a natural A. beverage. Rain-water has a mawkish, insipid taste, mainly because of the minute quantity of gas therein dissolved; but when that rain-water trickles down the mountain-side, and is dashed from ledge to ledge of rock, it absorbs and dissolves the gases from the air, and is thus naturally aerated. Many waters are aerated in a natural but peculiar way, which confers upon them important medicinal properties; and these will come before us under their more popular title of *mineral-waters*.

ÆRIAL POISONS. See MIASMA.

ÆRIANS, a sect founded by Ærius of Pontus, who opposed prayers for the dead, the keeping of Easter, and certain forms of church government, holding no difference between a bishop and a presbyter.

AERODYNAMICS is that branch of science which treats of air and other gases in motion. It examines first the phenomena of air issuing from a vessel, which correspond in many respects with those of water. See **HYDRODYNAMICS**. Much depends, as in the case of water, upon the nature of the orifice, whether a mere hole in the side of the vessel, or a tube or adjutage. Another subject of A. is the motion of air in long tubes, where the resistance of friction, etc., has to be ascertained. That resistance is found to be nearly in proportion to the square of the velocity, to the length of the tube, and inversely to its width. A. examines also the velocity of air rushing into a vacuum, of wind, etc. The instrument used for the latter purpose is called an anemometer. See **WIND**. Air is found to rush into a void space at the rate of from 1300 to 1400 ft. per second. One of the most important inquiries in A. is the resistance offered to a body moving in air, or—which is the same thing—the pressure exerted by air in motion upon a body at rest. The law may be stated, with sufficient accuracy for practical purposes, as follows: *The resistance or pressure is proportional to the square of the velocity*. We might conclude from reason, without experiment, that such would be the case; for if one body is moving through the air four times faster than another of the same size, not only will it encounter

four times as many particles of air, but it will give each of them four times as great an impulse or shock, and thus encounter 4×4 , or sixteen times as much resistance.

This resistance is greatly increased by another circumstance, especially with great velocities. The air in front of the moving body becomes accumulated or condensed, and a partial or even entire vacuum is formed behind it. With a velocity of 1700 ft. per second, for instance, the resistance is found to be about three times as great as the simple law of the square of the velocity would give. By the operation of these laws of resistance, a heavy body let fall with a parachute attached to it, comes, after a certain time, to move with a velocity approaching more and more nearly to a uniform motion.

A'Ë ROE, or **ARRÖE**, an island in the Baltic, 10 m. s. of Funen; 14 m. long and 5 wide; it has a port and is well cultivated; pop. 12,400. It belongs to Denmark, and the capital, **Aëroesjköbing**, is a port of some shipping importance.

AËROKLI'NOSCOPE, an instrument to show differences of barometric pressure at remote stations. It consists of a vertical axis 30 ft. high, turning on a pivot, carrying at the top a horizontal arm, of which the inclination can be varied according to the difference of barometric pressure at different sides of the station; the amount of dip being indicated by a sliding rod held in position by graded notches at the lower part of the axis, each notch corresponding with one millimeter in pressure. It is used in the weather service.

A'EROLITES (Gr. *aer*, air, and *lithos*, stone), or **METEORIC STONES**, **FIREBALLS**, and **SHOOTING-STARS**, are now classed together as being merely varieties of the same phenomenon. A. that fall during the day are observed to be projected from a small dark cloud, accompanied by a noise like thunder or the firing of cannon; at night they proceed from a fireball, which splits into fragments with a similar sound. It is believed that the dark cloud that accompanies the fall of A. by day would be luminous at night; and smoking, exploding fireballs have sometimes been seen luminous even in the brightness of tropical daylight. The connection between A. and fireballs is thus established. Fireballs, again, cannot be separated from shooting-stars, the two phenomena being sometimes blended, and also being found to merge into one another, both with respect to the size of their disks, the emanation of sparks, and the velocities of their motion.

There are numerous records and stories in all ages and countries of the fall of stones from the sky, but until recent times they were treated by philosophers as instances of popular credulity and superstition. It was not till the beginning of the 19th c. that the fact was established beyond a doubt.—According to Livy, a shower of stones fell on the Alban mount, not far from Rome, about 654 B.C. The fall of a great stone at **Ægospotami**, about 467 B.C., is recorded in the *Parian Chronicle* (see **ARUNDEL MARBLES**), and by Plutarch and Pliny. It was still shown in the days of Pliny (d. 79 A.D.), who describes it as the size of a wagon, and of a burned color. In the year 1492 A.D., a ponderous stone, weighing 260 lbs., fell from the sky near the village of **Ensisheim**, in Alsace; part of it is still to be seen in the village church. An extraordinary shower of stones fell near **L'Aigle**, in Normandy, on the 26th April, 1803. The celebrated French philosopher, **M. Biot**, was deputed by government to repair to the spot and collect the authentic facts; and since the date of his report the reality of such occurrences has no longer been questioned. Nearly all the inhabitants of a large district had seen the cloud, heard the noises, and observed the stones fall. Within an elliptical area of seven m. by three, the number of stones that had fallen could not be less than two or three thousand; the largest were 17 lbs. in weight. These are only a few out of hundreds of instances on record.

As was natural with objects of such mysterious origin, meteoric stones have always been regarded with religious veneration. At **Emesa**, in Syria, the sun was worshiped under the form of a black stone, reported to have fallen from heaven. The holy **Kaaba** of Mecca, and the great stone of the pyramid of **Cholula**, in Mexico, have all the same history.

The existence of such bodies once admitted, led to assigning a meteoric character to strange ferruginous masses found in different countries, and which had no history, or were only adverted to in vague tradition. Of this kind is the immense mass seen by **Pallas** in Siberia, now in the imperial museum at St. Petersburg. The largest known is one in Brazil, estimated at 14,000 lbs.

One constant characteristic of meteoric stones is the fused black crust, like varnish, with which the surface is coated. From the circumstance of this coat being very thin, and separated from the inner mass by a sharply defined line, it is thought to indicate some rapid action of heat which has not had time to penetrate into the substance of the stone. This view is favored by the fact that the stones are found in a strongly heated but not incandescent state when they fall. Their specific gravity ranges from two to seven or even eight times that of water.—As to their chemical composition, the predominating element is iron, in a native or metallic state, generally combined with a small proportion of nickel. According to **Humboldt**, the A. that fell in the neighborhood of **Agram**, in Croatia, in 1751, the Siberian stone, and specimens brought by that philosopher from Mexico, contain 96 per cent of iron; while in those of **Sienna** the iron scarcely amounts to 2 per cent, and, in some rare instances, metallic iron is altogether wanting.

A writer in the *Quarterly Review*, No. CLXXXIII., thus sums up the result of all the chemical analyses hitherto made: "We find the actual number of recognized elements discovered in A. to be nineteen or twenty—that is, about one third of the whole number of elementary substances (or what we are yet forced to regard as such) discovered on the earth. Further, all these A. elements actually exist in the earth, though never similarly combined there. No new substance has hitherto come to us from without; and the most abundant of our terrestrial metals, iron, is that which is largely predominant in A., forming frequently, as in some of the instances just mentioned, upwards of 90 parts in 100 of the mass. Seven other metals—copper, tin, nickel, cobalt, chrome, manganese, and molybdena—enter variously into the composition of these stones. Cobalt and nickel are the most invariably present; but the proportion of all is trifling compared with that of iron. Further, there have been found in different A. six alkalis and earths—namely, soda, potash, magnesia, lime, silica and alumina; and, in addition to these, carbon, sulphur, phosphorus and hydrogen. Finally, oxygen must also be named as a constituent of many A., entering into the composition of several of the substances just mentioned. As respects the manner of conjunction of these elements, it is exceedingly various in different A. A few there are, especially examined by Berzelius and Rose, containing olivine, augite, hornblende and other earthy minerals, and closely resembling certain crystalline compounds which we find on the surface of the earth."

Besides those solid masses of considerable size, numerous instances are on record of showers of dust over large tracts of land; and it is remarkable that such dust has generally been found to contain small hard angular grains resembling augite. Stories of the fall of gelatinous masses from the sky are ranked by Humboldt among the mythical fables of meteorology. It has been supposed that such fables may have originated in the very rapid growth of gelatinous algæ, as *Nostoc* (q.v.).

Fireballs and Shooting-stars.—From the height and apparent diameter, the actual diameter of the largest fire balls is estimated by Humboldt to vary from 500 to 2800 ft.; others allow a diameter of about a mile. Shooting-stars are much smaller, their weight varying from 30 grains to 7 lbs. In most cases of luminous meteors, a train of light many miles in length is left behind. One or two instances are on record where the train of the fireball continued shining for an hour after the body disappeared. The heights of shooting-stars are found to range from 15 to 150 m. at the points at which they begin and cease to be visible. Their velocities vary from 18 to 36 m. in a second. When it is remembered that the velocity of Mercury in its orbit is 26.4 m. in a second, of Venus 19.2, and of the earth 16.4, we have in this fact a strong confirmation of the planetary nature of meteorites.

One of the most remarkable facts connected with shooting-stars is, that certain appearances of them are *periodic*. On most occasions they are *sporadic*—that is, they appear singly, and traverse the sky in all directions. At other times they appear in swarms of thousands, moving parallel; and these swarms are periodic, or recur on the same days of the year. Attention was first directed to this fact on occasion of the prodigious swarm which appeared in N. America between the 12th and 13th of Nov., 1833, described by Prof. Olmsted, of New Haven. The stars fell on this occasion like flakes of snow, to the number, as was estimated, of 240,000, in the space of nine hours, and varying in size from a moving point or phosphorescent line to globes of the moon's diameter. The most important observation made was that they all appeared to proceed from the same quarter of the heavens—the vicinity, namely, of the star γ , in the constellation Leo; and although that star had changed greatly its height and azimuth during the time that the phenomenon lasted, they continued to issue from the same point. It was afterwards computed by Encke that this point was the very direction in which the earth was moving in her orbit at the time. Attention being directed to recorded appearances of the same kind, it was observed with surprise that several of the most remarkable had occurred on the same day of Nov., especially that seen by Humboldt at Cumana in 1799, and by other observers over a great extent of the earth. The November stream was again observed in the U. S. in 1834, between the 13th and 14th, though less intense. Though often vague, and in some years altogether absent, this phenomenon has recurred with such regularity, both in America and Europe, as to establish its periodic character.

Another periodic swarm of considerable regularity is that appearing between the 9th and the 14th of Aug., and noticed in ancient legends as the "fiery tears" of St. Lawrence, whose festival is on the 10th of that month. There are other periodic appearances, and Humboldt gives the following epochs as especially worthy of remark: 22d to 25th of April; 17th of July; 10th of Aug.; 12th to 14th of Nov.; 27th to 29th of Nov.; 6th to 12th of December.

It remains to notice briefly the various opinions that have been advanced as to the origin of aerolites, and the theory of meteors in general. The hypotheses that have been formed in answer to the question—Whence come those solid masses that fall upon the earth?—are of two kinds; some ascribing to them a telluric origin, and others making them alien to the earth. Of the first kind is the conjecture that they may be stones ejected from terrestrial volcanoes, revolving for a time along with the earth, and at last returning to it. Another theory, which at one time found considerable favor, supposed that the matter of which aerolites are composed existed in the atmosphere in the form of vapor, and was by some unknown cause suddenly aggregated and precipitated to the

earth. These conjectures are untenable in the face of the facts of the phenomena stated above, and are now completely given up.

In seeking a source beyond the earth, the moon readily presented itself. Olbers was the first to investigate (1795) the initial velocity necessary to bring to the earth masses projected from the moon. This "ballistic problem," as Humboldt calls it, occupied, during ten or twelve years the geometers Laplace, Biot, Brandes and Poisson. It was calculated that, setting aside the resistance of air, an initial velocity of about 8000 ft. in a second, which is about five or six times that of a cannon-ball, would suffice to bring the stones to the earth with a velocity of 35,000 ft. But Olbers has shown that to account for the actual measured velocity of meteoric stones, the original velocity of projection must be fourteen times greater than the above. It is against this lunar theory, that we have no proof of active volcanoes now existing in the moon; and with the improvement of the telescope, the probability of the contrary is increasing. It is, accordingly, giving place to the planetary theory, which we noticed at the outset.

The discussion of hypotheses as to the genesis of the recognized planets out of portions of the gradually contracting vaporous mass of the sun; the continued discovery of hitherto unobserved planets between the orbits of Mars and Jupiter; the countless multitudes of comets that are observed traversing our system in all directions, and undergoing appreciable alteration both of consistency and orbit—all prepare us for the idea that matter may exist in the inter-planetary spaces, in every variety of form and condition. To account for the phenomena of meteors as above described, we must suppose that there are both detached masses, each revolving in an independent orbit, and giving rise to *sporadic* meteors; and also connected systems, forming rings or zones round the sun. The intersection of the earth's orbit by such zones or streams would account for the periodic swarms of meteors; and if we suppose the asteroids composing it to be irregularly grouped, we see a reason why the same stream should not be always of equal intensity. There may even be periodicity in this respect too. Between 1799 and 1833—two of the most brilliant manifestations of the November stream on record—there elapsed 34 years; and the next brilliant appearances were in 1866 and 1867, as Olbers had predicted.

What causes the luminous and ignited condition of *aërolites*? Terrestrial magnetism was at one time suggested as the exciting cause. It is now recognized, however, that the atmosphere extends, although in a very rare condition, to at least a height of 200 m., and the ignition is believed to be caused by friction between the rapidly moving body and the air. As to meteors unattended by *aërolites*, we may suppose that some are merely deflected from their path by the proximity of the earth, are rendered luminous through a short arc, and continue their course with altered orbit, while the greater part are soon burnt up and fall to the earth in impalpable dust. See METEORS. See illus., METEOR OLOGY, vol. IX. ; MICROSCOPIC PICTURES, vol. IX.

ÆRONAUTICS, the art of navigating the air. See BALLOON and FLYING FLIGHT.

ÆEROPHYTES. See EPIPHYTES.

ÆEROSTATIC PRESS. This is a machine used for extracting the coloring-matter from dye-woods and such like. A vessel is divided by a horizontal partition pierced with small holes. Upon this the substance containing the color is laid, and a cover, also perforated, is placed upon it. The extracting liquid is then poured on the top, and the air being drawn from the under part of the vessel by a pump, the liquid is forced through the substance by the pressure of the atmosphere.

ÆEROSTATICS. This branch of science treats of the equilibrium and pressure of air and other gases, and of the methods of measuring it by the barometer and other instruments. The expansive force or pressure of atmospheric air varies with time and place. In a medium condition of the atmosphere, and near the sea-level, barometrical observations give the pressure or weight equal to that of a column of mercury, 30 inches high, or of a column of water about 34 feet high. This makes the mean pressure of the atmosphere nearly 15 lbs. on every sq. in. This mean pressure of the atmosphere is generally taken as the unit or measure of expansive or elastic forces generally; any particular pressure is said to be equal to so many atmospheres. A. also investigates the phenomena of the compression of gases; in other words, the relation between the pressure and the density and volume of a gas. According to the experiments of Boyle & Mariott the volume of a gas at uniform temperature varies inversely as the pressure to which it is subjected. In the experimental testing of this law it is of course necessary, after compressing or expanding the gas, to cool it in the former case or heat it in the latter, in order to bring the gas to its original temperature. This law is assumed to be correct for the ideally perfect gas, and is very nearly correct for air. The density of a gas varies inversely as the volume, and on account of its weight and compressibility the density will also vary as some function of the height of the gas. At heights above the sea level taken in arithmetical progression the atmospheric pressure diminishes in geometrical progression. At 5000 feet the barometer stands at 24.7 in.; at 10,000 ft. 20.5 in.; at 15,000, 16.9 in.; and at 5 miles, 8.9 in. This furnishes a means of measuring heights by the barometer (q.v.). Gay-Lussac found by experiment that the increase of pressure in a fixed volume of gas is directly proportional to its increase of temperature. For a perfect gas the expansion for 1° F. is equal to $\frac{1}{459.7}$ and for 1° C. $\frac{1}{273}$ of its bulk.

These figures are sufficiently accurate for air and several of the more perfect gases. An extension of the law of uniform expansion leads to the theory that at -274°C . the perfect gas would be destitute of volume and pressure, and would be absolutely deprived of heat. The absolute zero of temperature is therefore considered as -274°C . Absolute temperatures reckoned from this absolute zero have been found to greatly simplify mathematical formulas in regard to heat.

ÆSCHINES, an Athenian orator, second only to Demosthenes, whose contemporary and rival he was. Philip of Macedon was then pursuing his designs for the subjugation of the several Greek states to his own sway; and while Demosthenes advocated the policy of opposing him before it was too late, Æ. was the head of the peace-party. Æ. was a member of more than one embassy sent by the Athenians to deal with Philip; and Demosthenes accused him of receiving bribes from the Macedonian monarch, and of betraying the cause of Athens and of her allies. There is no proof that this was the case; and perhaps Æ. was deceived by the wily Philip into believing that he meant no harm to the liberties of Athens, and that peace was the best policy for his countrymen. The result justified the sagacious fears of Demosthenes, and condemned the selfish, isolating policy of Æ. When it was proposed to reward Demosthenes with a golden crown, for his patriotic exertions in defense of his country, Æ. brought an accusation of illegality against the proposer, Ctesiphon. Demosthenes replied, and Æschines being vanquished, and having thus incurred the penalty attached to an unfounded accusation, was obliged to retire from Athens. He finally established a school of eloquence in Rhodes, which enjoyed a high reputation. On one occasion, he read to his audience in Rhodes his oration against Ctesiphon; and some of them expressing their astonishment that he should have been defeated in spite of such a powerful display, he replied: "You would cease to be astonished if you had heard Demosthenes." The oration against Ctesiphon and two others are the only authentic productions of Æ. that have come down to us. He was b. 389 B.C., and d. at Samos 314 B.C.

ÆSCHYLUS, one of the greatest names in the history of the Greek drama, the son of Euphorion, was born in the year 525 B.C., at Eleusis, a town of Attica, about six miles southwest from Athens. In the first Persian invasion, his brother was killed at the battle of Marathon and he himself was severely wounded, and, during the second invasion, he took part in the battles of Salamis, Plataea, and Artemisium.

He was defeated by Simonides when they competed in elegies over those who fell at Marathon, and he contended, unsuccessfully, with Cherilus, Pratinas, and Phrynichus, until in 468 B.C., he was awarded a prize for tragedy. Sophocles triumphed over him in 468 B.C., but ten years later, he overcame Sophocles. He is reported to have won thirteen tragic victories.

He visited Syracuse twice, and on the first occasion, made a prolonged stay at the invitation of Hiero, who was endeavoring to increase the literary importance of his capital by gathering to it as many celebrities as possible. At the request of that king, Æschylus wrote a local piece called the *Ætneans* in celebration of the founding of a city called Ætna on the site where Catana had anciently stood. The second visit of the poet to Sicily was made when he had been accused of treating with disrespect or of divulging the Eleusinian mysteries in his plays. He barely escaped conviction by the court of the Areopagus, and always cherished some resentment at what he regarded as an unfounded charge.

He died at Gela in Sicily, 456 B.C. His death is said to have been caused by the fall of a tortoise on his head from the talons of an eagle that had mistaken the shiny bald spot for a rock convenient for cracking his prey. But the story is believed to have no better foundation than a mistaken interpretation of the scene inscribed on his monument. The citizens of Gela erected a splendid tomb to him, and the Athenians not only set up a statue to his memory, but offered a reward out of the public fund to any choregus who should present his plays.

The period of productiveness in Æschylus extended over forty years, during which time he is said to have written ninety plays. The tragic plays were generally in groups of three, called trilogies, strung upon some connecting thread of motive and interest, and followed, in the presentation, by some satirical piece. Of such satirical pieces, Æschylus is reported to have composed twenty, but they are included in the ninety referred to. There remain sixty titles conceded to be genuine, and many fragments, although only seven complete plays survive. Those remaining plays are the *Suppliants* (*Supplices*), the *Persians* (*Persæ*), the *Seven against Thebes* (*Septem contra Thebas*), the *Prometheus Bound* (*Vinctus*) and the Oresteian trilogy, composed of the *Agamemnon*, the *Libation Bearers* (*Chæphori*) and the *Furies* (*Eumenides*).

The *Suppliants* was probably the earliest of the tragedies of Æschylus and has been attributed to the seventy-first or seventy-second Olympiad, about 496 B.C. The daughters of Danaus, the Danaïds, are the "suppliants." They are sought in marriage by their cousins, the sons of Ægyptus, whom they do not love. To escape this objectionable union, they have fled from Egypt to Argos in the hope of finding an asylum at the native place of the Argive Io, from whom they have descended. The succeeding piece of the trilogy was the Danaïdes, which records the marriage and the murder of the sons of Ægyptus. The choice songs in the *Suppliants* are extremely fine.

In order of time, the *Persians* is believed to have followed the *Suppliants*, and to have been produced in 472 B.C. It was the second piece of a trilogy preceded by the *Phineus*

and followed by the *Glaucus*. The satirical piece which completed the tetralogy was *Prometheus Pyrphorus*. The subject of the *Persians* was the battle of Salamis. The effect must have been indescribably thrilling since a large number of those in the audience had taken part in the battle. The scene is laid at the Persian court and the chorus is composed of old men. In this play Æschylus advanced the dramatic art one step farther by introducing a second actor. He came in the person of the messenger who announced the disaster at Salamis. Previously never more than one speaking actor was present on the stage at a time, and if any dialogue occurred, it was carried on between that single actor and the chorus. A ghost, too, makes its appearance in this play. The spirit of Darius rises at the invocation of Atossa, the mother of Xerxes, and accounts for the calamity that has overtaken the Persians.

The *Seven against Thebes* was a favorite subject with the tragedians. This play of Æschylus was brought out in 467 B.C., and, like all of his tragedies, was part of a trilogy. It was the third piece, the first having been called *Laius* and the second entitled *Edipus*. The afterpiece was the *Sphinx*. The play presents the conflict between Eteocles and Polynices, the sons of Edipus, who kept their father in strict confinement after he had blinded himself. Anger at this restraint led Edipus to pray that, with the sword, they might divide the kingdom. To defeat the purpose of that prayer, the brothers agreed to reign alternate years, but Eteocles, the elder, once upon the throne, refused to surrender control at the expiration of the first year. Polynices, having raised a large army at Argos, where he had married the daughter of king Adrastus, came to besiege Thebes, and he, with six other chieftains, arrayed themselves each before one of the seven gates.

The *Prometheus Bound*, produced about 464 B.C., was the second part of a trilogy, and is supposed to have been followed by a *Prometheus Unbound*. The legend of the theft of fire by Prometheus is too well known to need repetition. The origin of the hero's name has, at last, been revealed in the Sanskrit, where it has been found to designate a pointed stick which is used to generate fire by revolving it on a disk of wood. The word is *pramantha* and sometimes *pramâthyus*. That discovery has swept away as rubbish the fruits of much curious speculation. In the play, Strength and Force come upon the stage as assistants of Hephæstus, and fasten Prometheus to a mountain of that Scythia in Europe which the Greeks used as a symbol of extreme distance. Io, transformed into a heifer, also comes to Prometheus and receives his sympathy, since she has suffered as much from the love of Zeus as had Prometheus from his hate. The meeting between Hermes and Prometheus is spirited in the extreme.

The Oresteian tragedies, brought out in 458 B.C., are a complete trilogy, of which the whole has survived, although the satirical afterpiece has been lost. With this trilogy Æschylus ended his labors as a dramatist, and it exhibits his maturest work.

The first division of the trilogy, the *Agamemnon*, opens on the eve of the fall of Troy and the transmission of the news to Argos by signal fires from height to height. Agamemnon soon appears with Cassandra, foreboding evil and reluctant to enter the palace. Immediately on their entrance, they are slain by the treacherous Clytemnestra.

The second piece, the *Libation-Bearers*, relates the filial devotion of Electra, the daughter of Agamemnon, who every day offers libation at her father's grave. Her brother, Orestes, equally devoted to his murdered parent, appears with Pylades, his cousin, and accomplishes the slaughter of Clytemnestra and her paramour. This act of Orestes, in taking the law into his own hand, is, like most human conduct, compounded of mingled good and evil. The duty of avenging his father included slaying his mother, and thus he has exposed himself to the attacks of the Furies.

Accordingly, the third piece of the trilogy, termed the *Furies*, exhibits the pursuit of Orestes by those tormentors. He is delivered from this danger by the interposition of Athene, who diverts the wrath of the hostile divinities by promising them a sanctuary.

ÆSCULA PIUS appears in Homer as an excellent physician, of human origin; in the later legends, he becomes the god of the healing art. The accounts given of his genealogy are various. According to one story, he was the son of Coronis and the Arcadian Ischys. Apollo, enraged by the infidelity of Coronis, caused her to be put to death by Diana, but spared the boy, who was afterwards educated by Chiron. In the healing art Æ. soon surpassed his teacher, and succeeded so far as to restore the dead to life. This offended Pluto, who began to fear that his realm would not be sufficiently peopled; he therefore complained to Jove of the innovation, and Jove slew Æ. by a flash of lightning. After this he was raised to the rank of the gods by the gratitude of mankind, and was especially worshipped at Epidaurus, on the coast of Laconia, where a temple and grove were consecrated to him. Here oriental elements, especially serpent-worship, seem to have been mingled with the rites and ceremonies. From Epidaurus the worship of the healing god extended itself over the whole of Greece, and even to Rome. According to Homer, Æ. left two sons, Machaon and Podalirios, who, as physicians, attended the Greek army. From them the race of the Asclepiades descended. Hygieia, Panacea, and Ægle are represented as his daughters. His temples usually stood without the cities in healthy situations, on hillsides, and near fountains. Patients that were cured of their ailments, offered a cock or a goat to the god, and hung up a tablet in his temple, recording the name, the disease and the manner of cure. Many of those votive tablets are still extant. The statue of the god at Epidaurus, formed of gold and ivory by Thrasymedes, represented Æ. as seated on a throne, and holding in one hand a staff with a snake coiled round it, the other hand resting on the head of a snake; a dog, as emblem of watchfulness, at the foot of the deity. Praxiteles and other sculptors represented the

god as an ideal of manly beauty, and closely resembling Jupiter; with hair thrown up from the brow, and falling in curls on each side. The upper part of the body was naked, and the lower was covered by a mantle falling in folds from the shoulders. He had sometimes a laurel-wreath on his head, and a cock or owl at his feet; or was attended by a dwarf-figure named Telesphorus.—ASCLEPIADES, the followers of Æ., who inherited and kept the secrets of the healing art; or, assuming that Æ. was merely a divine symbol, the Asclepiades must be regarded as a medical, priestly caste who preserved as mysteries the doctrines of medicine. The members of the caste, or medical order, were bound by an oath—the *Hippocratis iusjurandum*—not to divulge the secrets of their profession. In Rome, 292 B.C., when a fatal pestilence prevailed, the Sybilline books commanded that Æ. must be brought from Epidaurus. Accordingly, an embassy was sent to this place, and, when they had made their request, a snake crept out of the temple into their ship. Regarding this as the god Æ., they sailed to Italy, and, as they entered the Tiber, the snake sprang out upon an island, where, afterwards, a temple was erected to Æ., and a company of priests appointed to take charge of the service and practice the art of medicine. Hippocrates is said to have descended from the Asclepiades of Cos.

ÆSIR (plural of AS, or "god"), the gods of the northmen of Scandinavia and Iceland. There were twelve chief gods or Æ., besides Odin (the "all-father"), viz.: Thor, Baldur, Niord, Frey, Ty, or Tyr, Bragi, Heimdal, Höd, Vidar, Ull, Forseti, and Loki, or Lopt. The chief goddesses of Asgard, the Scandinavian Olympus, were: Frigg, Freyja, Nanna, Sif, Saga, Hel, Gefion, Eir, Hlin, Lofn, Vor, and Snotra. These names, considered in the primary old Norse signification of the words, in most instances allude to some characteristics; yet it is impossible to determine whether they personify merely certain physical powers of nature, or were originally the names of individuals in the prehistoric period. Probably they have a mixed origin, and combine real names with physical powers. The principal source of information concerning these gods are the "Eddas" (q.v.), collections of the oldest songs and traditions of the people of Scandinavia. Thor, the son of Odin and Frigg ("the vivifying"), is the strongest of the Æ. He seems to have been a god of that Phœnician form of nature worship which was superseded in Scandinavia and northern Germany by the faith of Odin. From Thor's hammer flashed lightning, and his chariot wheels made thunder as he went through the air, cleaving mountains, loosening frozen streams and pent-up rivers, and slaying giants and monsters. He was seldom in Asgard with the other Æ., but dwelt in his mansion Bilskirner, in the densest gloom of the clouds. With his hammer he consecrated the newly wedded, and the sign of the hammer was made by Northmen when they took an oath, or any serious obligation. The early Christian missionaries in Scandinavia, finding the faith in Thor too strong to be suddenly uprooted, tried to transfer many of his characteristics to their zealous convert, St. Olaf, who was said to have resembled the old Norse god in his comeliness of person, his bright red beard, hot angry temper, and personal strength; while some of the monks of a later period tried to persuade the Northmen that in Thor their forefathers had worshipped Christ, and that his mallet was a rude image of the cross. Slaves and thralls killed in battle were believed to be under the protection of Thor, who, as the god of the Finns before the spread of the As religion, was honored as their special guardian against the tyranny of their old masters. In Baldur the Norsemen honored the beautiful, the eloquent, the wise and the good, and he was the spirit of activity, joy and light. His name signifies the "strong in mind." His wife Nanna reflected these attributes in a less degree. On his life depended the activity and happiness of all the Æ., except Loki, the "earthly fire" or incarnation of evil; and hence Loki, from envy of the beauty and innocence of Baldur, accomplished his death, and afterwards hindered his release from the power of Hel, the goddess of death. As the death of Baldur was to be followed by the fall of all the Æ., the gods had caused all things to swear not to injure him. But the insignificant mistletoe was overlooked or thought unimportant. Loki secured an arrow of mistletoe, and when the gods were amusing themselves by shooting at the invulnerable Baldur, Loki gave this arrow to Höd, the blind god, and directed his aim so as to hit Baldur, who was killed. The death of this beneficent god signifies the fading of summer before the blind and fierce winter, her preordained destroyer. The myth continues: After Baldur's death, the gods captured Loki and shut him in a mountain, where he will remain until the earth and all therein and the gods themselves will be destroyed by fire (the powers of evil), the companion and liberator of Loki. Odin alone will survive, and then a new and purer world will arise in which Baldur will again appear, and Loki, or evil, be no more heard of. In the beginning of time, Loki, under the name of "Lodthur," or "flame," and as the foster brother of Odin, had united with the all-father in imparting blessings to the universe. Afterwards he left the council of the gods, and wandered into space, desolating and consuming with flame all things that came in his way. In the under-earth, where volcanic fires attest his presence, he consorted with evil giantesses and became the father of Hel, "pallid death," of Angurboda, "announcer of sorrow," the wolf Fenrir, and the Midgard serpent, who ever threaten the destruction of the world. Loki assumes any shape at will. As sensuality he courses through the veins of men, and as heat and fire pervades nature and causes destruction. After the establishment of Christianity the attributes of Loki were transferred to satan; but in Iceland an *ignis fatuus* is still known as "Loki's burning." Niord and his children Frey or Fricco, and Freyja appear to have been honored in the

north before the time of Odin. Niord is said to have lived in Vanaheim, and to have ruled over the Vanir, or elves of light, long before he became one of the Æ. He is the god of oceans and controller of winds and waves, and to him sea-farers and fishermen raise altars and make prayers. Frey, his son, is the god of rain and fruitfulness, and his worship was accompanied with phallic rites. His sister and wife, Freyja, who holds a high rank among the Æ., is the goddess of love, but her influence, unlike her husband's, is not always beneficent, and varies with the form she assumes in operating on the minds of men. Her chariot is drawn by cats, who are emblems of fondness and passion; and a hog, implying fructification or sensual enjoyment, attends upon Frey and herself. The Swedes paid especial honor to Frey, while the Norwegians worshiped Thor. Ty or Tyr was the Mars of the Norsemen. He is wise and brave, and gives victory, but he fomented strife. His name lives, in our Tuesday (Ty's day), and so does the name of Odin in Wednesday (Woden's day), Thor in Thursday (Thor's day), and Frey and Freyja in Friday, (Frey's day). Tyr's name signifies "honor," and his worship was widely spread in the north. Bragi was the god of eloquence and wise sayings, the originator of the Skaldic poems; and when men drank Bragi's cup they vowed to perform some great deed worthy of a skald's song. At guilds and grave-feasts this Bragi cup was drunk; and at the funerals of kings or jarls the heir was not permitted to take the official place till "bragarfull" was brought in, when, rising to receive it, he drank the contents of the cup and was led to the high seat of honor. Bragi's wife was Idun, who guarded the casket of apples that gave to those who ate them perpetual youth. She was abducted by the giant Thiassi, and by Loki's craft removed to the other world. Her release in spring seems analogous to the myth of Prosperine. Heimdal, personified by the rainbow, is the god of watchfulness, the doorkeeper of the Æ. Vidar, the strongest of the gods except Thor, is the personification of silence and caution. Ull decides issues in single combat; Forseti settles all quarrels; lovers find protection in the goddesses Lofn and Vor, of whom the former unites the faithful and the latter punishes the faithless; Gefion keeps a watch over maidens, and knows the decrees of fate; Hlin guards those whom Frigg, the queen and mother of heaven, desires to free from peril. The queen herself, as Odin's wife and mother of the Æ., knows but does not reveal the destinies of men. As goddess of the earth she is known as Frygga, the "fertile summer earth," and as Rinda, the "frost hardened surface." Saga is the goddess of narration and history; her home is in Sockquabek, the abyss, an allusion to the abundant streams of narrative, from which streams Odin and Saga daily drink and pledge each other. Snotra is the goddess of sagacity and elegance, from whom men and women seek good sense and refined manners. The Norns and the Valkyrias are closely connected with the gods. The principal Norns are Urd, past time; Verdandi, present time, and Skuld, future time. They and the Valkyrias twist and spin the threads of destiny, and make known what has been decreed from the beginning of time. In the gods here mentioned the Northmen recognized the makers and rulers of the world that now is, from whom emanated the thought and the life that pervades and animates nature. With Odin and the Æ. the intellectual life of the northern people began; and although they ascribed to them human forms and acts, these were seldom without something higher and nobler than pertains to mortals; and while they recognized the existence of a state of chaos and darkness before the world began, they anticipated the advent of another state, in which the gods, like men, would receive their reward at the hands of a supreme All-father. See SCANDINAVIAN MYTHOLOGY.

ÆSOP, an ancient Greek writer, whose name is attached to the most popular of the existing collections of fables. His history is very uncertain, and some critics have even denied his existence. First among these is Luther, in his preface to the *German Æsop*, 1530. We are told, however, on the authority of Herodotus (ii. 134), Diog. Laertius (i. 72), and Plutarch (*Sept. Sap. Conviv.*, and *De Sera Num. Vind.*), that Æsop lived in the latter half of the 6th c. B. C.; that he was a slave at Samos; that, on receiving his freedom, he visited Croesus and Pisistratus, by the former of whom he was commissioned to distribute some money among the citizens of Delphi, and that on his refusal to pay it, in consequence of a dispute, he was thrown over a precipice by the infuriated mob. We are further informed that the Athenians erected a statue to him from the chisel of Lysippus. Whether this person was the author of the existing Æsopean collection or not, we know, from Aristophanes, and other authorities, that fables bearing his name were popular in the most brilliant period of Athenian literature. The conjecture of Bentley, however, seems well founded, that these fables were transmitted entirely through oral tradition. Socrates (*Phædo*, p. 61) turned such of them as he could remember into verse, of which Diog. Laertius has preserved a specimen; and the same was done by Demetrius Phalereus, 320 B. C. The only Greek version, however, of which any entire fables remain, and which, as shown by Bentley, has furnished materials to subsequent collections, is that of Babrius (q. v.), a writer of some mark, who is supposed to have lived in the age before Augustus. Of the fables now bearing the name of Æsop, there are three sets, the first from a MS. of the 13th c., published at Florence in 1809; the second a collection by Maximus Planudes, a monk of the 14th c., containing a life (supposed to have been the work of Planudes, till it was found in the earlier MS.) of Æsop, full of fabulous particulars; and the third a collection published in 1610, from MSS. found at Heidelberg. All these are contained in the edition of Schneider, Breslau, 1810. The resemblance between some of the fables

and the personal peculiarities attributed in common to Æsop and to the Arabian fabulist Lokman, have led some persons to conclude that the two men were identical; and others, that the fables are all derived from the Jatakas or Birth-stories of Buddha. (See PHÆDRUS.) The fables have been edited by Halm (1852), and by Eberhard (1872). See Bédier, *Les Fabulistes Latins* (1892).

ÆSOP, CLODIUS, a Roman actor contemporary with Roscius, excelling in tragedy. Cicero put himself under the direction of these two to perfect his own acting, and Æ. did many friendly services to Cicero during the latter's banishment. Æ. was noted for sinking his own personality in the character he represented. He made his last appearance in 55 B.C. at the dedication of Pompey's theater, after which his voice failed him. He left a fortune to a worthless son—the Æ. who dissolved a pearl valued at \$40,000 in vinegar to have the satisfaction of swallowing the most expensive drink ever known.

ÆSTHETICS, a term invented about the middle of the 18th c. by Baumgarten, a professor of philosophy in the university of Frankfort-on-the-Oder, to denote the science of the beautiful, particularly of art, as the most perfect manifestation of the beautiful. It has the merit of being at once comprehensive and clear, and has therefore been pretty widely adopted, of late years, by critics both in France and England. See ART.

The beautiful (Gr. *to kalon*) was a favorite subject of contemplation amongst the ancients. The name of Plato is inseparably associated with it, but in his philosophizings he nowhere separated the beautiful from the good. Aristotle, again, from the immense acquaintance which he possessed with objects of art, deduced the most admirable laws and rules (canons of criticism), so that his *poetics*, according to Schiller, constitute a true rhadamanthine tribunal for poets. But the results he arrived at are regarded by the *a priori* school of æstheticians as empiricism rather than science. Baumgarten they hold to be the first who considered the subject from the true scientific point of view, and therefore entitled to be called the founder of the philosophy of art. All sensuous apprehension, not in one form or manifestation only, but in every possible form or manifestation, was included in his view of the subject, and this conception he expressed by the word *æsthetics*, from the Greek *aisthanomai*, I feel, indicating not absolute or objective knowledge of things, but such as is conditioned subjectively by the play of our sensibilities. The term is thus not confined to the limits of the beautiful, though in point of fact we employ it in this partial signification. Beauty was, with Baumgarten, the result of the highest and purest æsthetic perception, to the realization of which the finer portion of our nature aspires; and to trace which through the whole sphere of art was the work of æsthetic philosophy (*sinnenerkenntniss*). Kant subsequently, from his point of view, carried out this theory of the æsthetic faculty in his critical treatise on the power of the judgment. Everything he conceived may be regarded æsthetically as well as absolutely, in reference to ourselves as well as in reference to nature. An object may be in harmony with our sensibilities, as well as in harmony with the totality of material phenomena; or it may not be in harmony with the former, and yet truly accord with the latter. So, too, with the judgment. It may choose to apprehend things in their adaptation to man, or in what is called the teleological point of view—that is, their final end or objective adaptation to each other. Hence the æsthetical judgment considers objects as beautiful, agreeable, or useful; while the teleological judgment strives to reach their absolute design, and remains indifferent to personal predilections. Why certain objects excite in us a purely selfish interest, and others a purely unselfish pleasure, Kant does not venture to determine, for he never investigates the objective quality of the beautiful, but confines himself strictly to its influence upon the feelings and desires. Schelling was the first to undertake this inquiry after Schiller had paved the way for him in his treatise on æsthetics. The latter, perhaps the most lucid and intelligible of German æstheticians, in a note to his twentieth letter on æsthetic culture, explains his conception of the new science as follows: All things that can ever be objects of perception may be considered under four different relationships. A fact can relate directly to our sensuous condition—that is its physical quality; or to the understanding—that is its logical quality; or to the will—that is its moral quality; or to the entirety of our different powers, rather than to any particular manifestation of these—that is its æsthetic quality. There is a culture for the health, for the understanding, for morality, and for taste or beauty; the last of which has for its design to bring out the totality of our sensuous and spiritual powers in their greatest possible harmony. Schiller's idea of the beautiful is necessarily as comprehensive as his conception of the sphere of Æ. He will not admit that it is the result of a mere limited experience, taught us through the operation of phenomena, animate and inanimate, on our senses, but of pure abstract reflection. It is, therefore, a transcendental idea. It originates in the perfect union of matter and spirit. From this it follows, that "beauty can be exclusively neither mere *life*, as some ingenious observers have maintained, nor mere *form*, as has been decided by some speculative philosophers and philosophizing artists" (for instance, Burke and Raphael Mengs).

Passing over Schelling's transcendental speculations, which are couched in a style not very intelligible to the English mind, we come to the theory of Hegel. Like that of Schelling, it also proceeds from the so-called metaphysics of the beautiful. It is the absolute ideal realizing itself. Nothing is truly beautiful except this. Nothing, therefore, which exists can be termed such. Out of the sphere of the pure reason

we have only an eternal aspiration. In the finite mind, the absolute ideal is always striving to realize itself, but never completely succeeds. There is only a ceaseless approximation. Hegel then traces the growth and development of the beautiful, the first form of whose existence is *natural* beauty, and, as Vischer justly adds, the beauty unfolded in history. But this beauty, whether of nature or history, is rare, accidental, fugitive, and tarnished by intermixture with the not-beautiful. This deficiency or limitation arises from its being unconscious of itself. The beautiful is, so to speak, as yet in its infancy. It does not know either that it is or what it is. It first passes into self-recognition in the dawn of human intelligence, and its conscious realization of itself increases in proportion to the culture of the race or the individual. The highest finite realization of it is art; for though the form of art be material, it is matter shaped according to an idea. The artist looks on the form simply as the objective embodiment of the idea—every remnant of rude nature being stripped off. Form, though springing out of matter, is thus a deliverance from matter, and the particular arts may consequently be regarded as the gradual working of the mind out of materialism. The formative arts—architecture, sculpture, painting—are silent, heavy, still partly material. Music is an advance on these. It breathes in a higher region. The materialism of sound becomes all but ideal. Poetry is a further advance. It is the pathway of the intellect to pure thought. Æsthetics, in this point of view, is a science, based on a knowledge of the historic development of the beautiful. It wanders through its whole kingdom, of which art is only a province, though, as has been seen, the richest and most valuable.

Such was the aspect in which Hegel regarded the new science. He fused it into his historico-transcendental metaphysic, and so stirred up regarding it the old quarrel which had agitated the latter. Realists made their appearance, who vigorously assailed the principles of Fichte, Schelling, and Hegel, in their various applications to philosophy, theology and Æ. The reaction was and is most conspicuous in the second of these, but has as certainly manifested itself in the others also. It is denied that the ideal conceived by man is superior to the real, as it is in itself. It is man who lowers it by his inadequate apprehension of its harmony and perfection. The greatest artist does not strive to outshine or even to reach the beauty of nature, but to surpass himself in it. The whole historic theory of Hegel is likewise rejected, after severe and searching criticism, from a rationalistic point of view. Hegel conceives the first efforts of art to have arisen from a longing on the part of the human spirit to emancipate itself from the thralldom of matter. This is the idealistic view of its beginning. Kugler, on the other hand, affirms that it arises from "the necessity which man is under to bind his thoughts to one firm spot, and to give to this memorial a form which may be expressive of the thought." The origin of art is thus made retrospective, not prospective. This may be considered the realistic view of its beginning.

In France, the founder of the eclectic school of philosophy, Victor Cousin, has eloquently expounded the Platonic view of Æ. In the second part of his treatise *Du Vrai, du Beau, et du Bien* (on the true, the beautiful, and the good), he has a chapter on "the beautiful in objects," in which, after discussing the principal theories of the materialists and geometricians, and pointing out what he conceives to be the errors and limitations of such theories, he proceeds to a consideration of physical, intellectual and moral beauty, endeavors to discover the quality or qualities in which they agree, from this rises to the apprehension of an ideal beauty whose realization he finds in God. "God," says Cousin, "in whom is combined absolute unity with infinite variety, is necessarily the realized ideal of all beauty."

Speculations on this subject in Britain have been mostly limited to the beautiful in form and color. British writers have not in general sought to discover the *idea* of the beautiful, but the beautiful itself. Their criticism may, and indeed does, seem meager and unphilosophical, but it is at least clear, and its purpose obvious. They have put to themselves this question: Are there, or are there not, constant qualities in certain objects which make them what we call beautiful? Does beauty arise from anything inherent in these, or does it depend upon accidents in us, such, for instance, as the complex and numberless phenomena of association? Is it objective or subjective?

The first publication on this subject of any consequence—if we except Lord Shaftesbury's *Characteristics*, in which there is set forth a "rapturous Platonic doctrine" impossible to criticise, because unintelligible—was Dr. Hutcheson's *Inquiry*, 1725. In this work, the existence of an "internal sense," through which we either obtain a perception of the beautiful or are made in some way conscious of its presence, was maintained. The notion of a sixth sense has been very severely criticised by Jeffrey in his celebrated article on beauty.

Certain explanations and modifications of this theory were made by the followers of Hutcheson, but nothing really new was brought out till Edmund Burke published his *Treatise on the Sublime and the Beautiful*, 1756. There is no work upon the subject so popular or so worthless. Every one has heard of it, large numbers have read it, and yet the fundamental principle is weak and absurd. He confounds the beautiful with the luxurious. "All objects appear beautiful which have the power of producing a peculiar relaxation of our nerves and fibres, and thus inducing a certain degree of bodily languor and sinking!"

Sir Joshua Reynolds, a contemporary of Burke, maintained a very remarkable theory

of the beautiful, which he borrowed from the celebrated Père Buffier, and illustrated at great length. Beauty was conceived to be the mean between two extremes. This doctrine is open to the fatal objection that the most ordinary is therefore the most beautiful, and that, consequently, the greatest poem or the finest landscape must be that which is the most commonplace. Nevertheless, Sir Joshua does not hesitate to push his theory to extremities, declaring that if what we term the deformed or monstrous were only more common than what we call the beautiful, they would exchange names and sensations—a statement which may safely be left to refute itself.

The next work on this subject that excited any measure of popular attention was Alison's *Essays on the Nature and Principles of Taste*, 1790. The theory propounded by this writer is generally known as the theory of association. The most powerful exposition of the association theory is that given by Jeffrey, in his famous article in the *Encyclopædia Britannica*, and in his critique on Alison in the *Edinburgh Review*, 1811. According to Jeffrey: "These emotions (that is, those excited by the contemplation of certain objects) are not original emotions, nor produced directly by any qualities in the objects which excite them; but are reflections or images of the more radical and familiar emotions to which we have already alluded, and are occasioned not by any inherent virtue in the objects before us, but by the accidents, if we may so express ourselves, by which these may have been enabled to suggest or recall to us our own past sensations or sympathies." In his defense of this theory, Jeffrey is obliged to consider those of Stewart and Payne Knight, the former of which is partly, and the latter entirely, opposed to his own. So long as he confines his argument to association in connection with *landscapes*, it seems very conclusive; but when he comes to combat Payne Knight's doctrine as to the intrinsic beauty of colors, it ceases to be satisfactory. This writer maintains that colors possess a primitive and original beauty, which may be enriched by association, but which does not depend upon it. Jeffrey denies this, and attempts to prove that our perception of the beauty of color, instead of being a "mere organic sensation," arises from association alone. In the same way, he refuses to believe that there is any independent or intrinsic beauty in form; and conceives that architecture owes its beauty not to the essential harmony of its proportions, but to a variety of curious considerations on our part. He considers Alison's analysis of this beauty, with special reference to Greek architecture, "perfectly satisfactory." It arises, 1, from the association of utility; 2, of security; 3, of the skill of the architect; 4, of magnificence; 5, of antiquity; 6, of Grecian greatness! To this it may be replied, that such associations *increase*, but do not *create*, our perception of the beauty of Greek architecture.

The theory of association in this its primitive nakedness cannot be said to be held now by any who think on the subject. It is felt to be more plausible and ingenious than sound or adequate. Ruskin, Prof. Blackie, and others have nearly destroyed its popularity. Prof. Blackie's three essays on beauty, which are remarkable for the brisk and biting humor with which they assail the association theory, as well as for the passages of fine eloquence which they contain, make a vigorous effort to indoctrinate the Saxon brain with the ideal speculations of Plato. Prof. Blackie is a Platonist in theory, but the elaboration of that theory is entirely modern and original. "Beauty," he says, "does not consist in one element, or in one power, or in one proportion, but in many elements, powers and proportions;" the principal of these are—order, congruity (or harmony), actuality, perfection (in the Platonic sense—viz., the full result of a creative energy), expressiveness, smoothness, delicacy, and curvature. With reference to this last principle, Prof. Blackie points to the fact that nature everywhere avoids angular lines, especially in the human figure, and most of all in the sex which has ever been considered the highest symbol of the beautiful. In the second volume of his *Lectures on Metaphysics*, the late Sir William Hamilton (lecture 46th) distinguishes beauty into absolute and relative. "In the former case," he says, "it is not necessary to have a notion of what the object ought to be before we pronounce it beautiful or not; in the latter case, such a previous notion is required. Flowers, shells, arabesques, etc., are freely or absolutely beautiful. We judge, for example, a flower to be beautiful, though unaware of its destination, and that it contains a complex apparatus of organs all admirably adapted to the propagation of the plant. When we are made cognizant of this, we obtain, indeed, an additional gratification, but one wholly different from that which we experience in the contemplation of the flower itself apart from all consideration of its adaptations." Sir William thus states his theory of free or absolute beauty: "In the case of beauty—free beauty—both the imagination and the understanding find occupation; and the pleasure we experience from such an object is in proportion as it affords to these faculties the opportunity of exerting fully and freely their respective energies. Now, it is the principal function of the understanding, *out of the multifarious presented to it, to form a whole*. Its entire activity is, in fact, a tendency towards unity; and it is only satisfied when this object is so constituted as to afford the opportunity of an easy and perfect performance of this its function. In this case, the object is judged beautiful or pleasing." Sir William concludes by defining the beautiful to be that "whose form occupies the imagination and the understanding in a free, full, and, consequently, an agreeable activity." One of the best modern writers on *Æ*, is the French critic Taine (q.v.).

There would seem, on the whole, to be a tendency at present towards an amalgama-

tion of what have hitherto been considered irreconcilable doctrines—towards the belief that there is an essential beauty in the harmony of forms and in the combination of colors, and that the keen delight which we experience in beholding them is incapable of being explained by any number of associations; while it is admitted, on the other hand, that many things are made beautiful by association, that all things have their beauty enriched by it, and that some things even have their intrinsic beauty called forth by it operating in the form of *suggestion*. See Lotze's *Outlines of Æsthetics* (Eng. tr. 1887).

ÆSTIVATION, in botany (from the Lat. *æstivus*, belonging to summer), a term employed to denote the manner in which the parts of the flower are disposed in the flower-bud prior to its opening. Sometimes the *Æ.* is *valvate* or *valvular*, when the parts of the same verticil exactly meet together by their edges, like valves. But if the edges are turned in, the *Æ.* is *induplicate*; if they are turned out, it is *reduplicate*. In many flowers, the *Æ.* is *contorted* or *twisted*; sometimes it is spirally *imbricated*. In pentamerous flowers, it is very generally *quincunxial*, two of the parts being external, two internal, and one intermediate. In *papilionaceæ* (q.v.), the other parts of the corolla are generally included in the standard or vexillum, and this is sometimes called *vexillary* *Æ.* In poppies, the petals are generally crumpled together before flowering. The *Æ.* of the calyx is frequently of a different kind from that of the corolla. Thus, in *geraniaceæ*, the *Æ.* of the calyx is imbricated, that of the corolla twisted. The manner in which the stamens and pistils are disposed in the bud is not so much taken into account in the characters of orders and genera, but is sometimes also noticed; thus, it is a character of *rosaceæ* that the stamens are curved inwards in *Æ.*

ÆTHRIOSCOPE, an instrument to measure degrees of cold produced by radiation towards a clear sky; useful in determining the amount of moisture present in the upper and inaccessible strata of the atmosphere.

ÆTIOLOGY. See **BIOLOGY**.

ÆTÏON, a Greek painter supposed to have lived in the 2d c. He was famous for beauty of coloring. Lucian describes his picture of the "Marriage of Alexander and Roxana."

ÆËTIUS, called "the atheist," lived in the 4th c. He favored the Arians, and was banished by Constantius, 356. He was a slave in early life; studied medicine and theology at Antioch; became a deacon, and developed the doctrines called the *Ætïan* heresy. He was made bishop by Julian, but late in life fell into immorality, and died without honor.

ÆËTIUS, a Roman general, b. near the end of the 4th c. He long defended Gaul from the barbarians; with Theodoric, he compelled Attila to raise the siege of Orleans; he followed the Huns to the plain of Chalons, and defeated them in a great battle, in which 300,000 men are said to have been slain. The emperor Valentinian became jealous of A., and slew him with his own hand. 454 A. D. An extant coin has the legend, "Ætïus Imperator Cæsar," which indicates that A. had seized or meant to seize the empire.

ÆTNA. See **ETNA**.

ÆTOLIA, a district of ancient Greece, lying on the n. coast of the gulf of Corinth. The ancient *Æ.* was divided from Acarnania by the river Achelous, and extended as far as the river Euenos. On the e. it was bounded by Locris and Doris; on the n. by Thessaly and Epirus; on the w. by Acarnania; and on the s. by the bay of Corinth. In later times these boundaries were considerably extended to the n. and e. The country had few cities, was generally wild and barren, and, according to Herodotus and Aristotle, was infested by lions on the banks of the Achelous and in other places. Here, according to the legend, Meleager slew the Calydonian boar (q.v.). The *Ætoli*ans make a great figure in the heroic age of Greece; but at the time of the Peloponnesian war, they were rude and barbarous. The *Ætolian* confederacy, first called into existence by the Lamian war (323 B. C.), became important in the time of the Achæan league (see **ACHAIA**). The several states assembled annually in autumn at Thermum. This assemblage was styled the *panætolicon*. At first they called in the aid of the Romans against the Achæan league; but as they saw that the Romans had designs against the independence of *Æ.*, they next allied themselves with Antiochus of Syria, afterwards with Perseus of Macedonia. In 189 B. C., they were compelled to share the fate of Macedon, and were subjugated by the Romans.—With Akarnania, *Æ.* now forms a province of the modern kingdom of Greece. The mountains in the n. e.—now styled *Vïna*—form a wild offset of the Pindus chain, and slope steeply on the s.w. down to the central plains, partly covered with morasses and partly cultivated. S. of the lakes Apokuro (anciently, Trichonis) and Zygos (Hyria) rise a range of mountains—the *Aracynthus* mountain of the ancients—which fall on the s.w. to a broad coast-level, occupied by morasses and lagoons; but on the s.e. side extend to the gulf, where the promontory of Antirrhion reaches to within 2400 yards of the opposite cape Rhion, thus forming the strait of Lepanto (Naupactos). The chief rivers of *Æ.* are the Aspropotamo (Achelous), in the w., and the Fidaris (Euenos), in the e. The people in the plains are employed in agriculture and fishing; while in the mountain districts some traces of the rude and martial character of ancient *Æ.* may still be found. The chief towns are Missolonghi and Lepanto (q.v.).

AFANASIEFF, ALEXANDER NIKOLAEVITCH, 1826-71; author of popular tales or folk-lore of the Russian people. He wrote *Poetic Views of Nature entertained by the Ancient Slavs*, and contributed largely to current literature.

A'FER, DOMITIUS, a Roman orator, teacher of Quintilian; b. in Gaul 15 B. C., died 60 A. D. He was made a consul by Caligula.

AFFIDAVIT, an oath in writing, or a written declaration made before a magistrate, or other person legally authorized to administer an oath, the truth of which is confirmed either by an oath sworn, or a solemn affirmation, such declaration to be signed by the party making it and duly attested by the authorized officer. Where evidence is required in England to be laid before a court or a judge, it is usually reduced to the form of an A., in place of being delivered orally, as in jury trial. An A. ought to set forth the matter of fact only, and not to declare the merits of the cause, of which the court is to judge (21 Car. I. B. R.). The name and designation of the party making the A. are written at length, and he signs it at the foot. When the paper is shown to him, he is required to swear or affirm that its contents are true, and that the name and handwriting are his. Affidavits in all the English courts must be taken and expressed in the first person of the deponent. In the United States, all judges, justices, notaries, commissioners, and some special officers, have authority of law to take affidavits. All the states appoint commissioners in other states (residents of such other) to exercise the power. By N. Y. law, affidavits may be taken anywhere for use in N. Y., if the person taking is authorized at the time and place to do so. Generally the authority of foreign officials to take A. must be certified or verified in court. When a judge takes an A. in court his signature must be authenticated. Our ministers and consuls abroad have power to take A., and so have British consuls and nearly all similar officers. No particular form of A. is prescribed. An A. of merit is one made by a defendant, which sets forth that he has stated his case to counsel and is by him advised that he has a good defense to the pending action on its merits. This is required to protect plaintiffs from delay by frivolous shows of defense, but does not always effect the purpose.

AFFILIATED COLLEGES. See COLLEGIATE EDUCATION FOR WOMEN.

AFFILIATION, or **FILIATION**, parentage, the relation between a child and its parents, also the ascertaining of parentage, the assignment of a child to its father or mother. It is generally used of the relation between a child and its father, but this appears to be due to the fact that there is seldom any need of it in the case of the mother, rather than to the exclusion of the mother from the meaning of the term. Presumption of the husband's paternity lies in the case of a child born to the wife during the coverture, or within a competent time thereafter, whether or not conceived during the coverture; but such presumption is rebuttable by proof that no cohabitation has taken place, or that it was physically or otherwise impossible for the husband to have been the father. In Scotland affiliation is the name of an action brought in the Sheriff Courts by the mother of a bastard, to recover aliment from its putative father. In French law the term refers to a species of adoption customary in some parts of France. Still another meaning of the word appears in ecclesiastical law, where it signifies a condition which prevented the superior from transferring the affiliated person to another convent.

AFFINITY (Lat. *affinitas*), the relationship created by marriage between the husband and the blood-relations of the wife, and between the wife and the blood-relations of the husband. The relations of the wife stand to the husband in the same degree of A. in which they stand to the wife by blood or consanguinity, and *vice versâ*. But between the relations of the two parties by A. there is no A. Thus, there is no A. between the husband's brother and the wife's sister; and by our law, there is no impediment to their marriage. The question as to whether those who are related by A. stand in all respects in the same position as regards marriage with those connected by blood, is one on which much difference of opinion at present prevails. Marriage between a man and the sister of his deceased wife is at present forbidden in England by statute; but an attempt is annually made in parliament to obtain its repeal. See **MARRIAGE**.

AFFINITY. Chemical A., or chemical attraction, is the force which produces all chemical phenomena. It differs from the attraction of gravitation in acting, not between masses, but between atoms, and only when the atoms are at insensible distances. It differs also from cohesion, which unites the particles of the same substance, while A. unites atoms of different substances. The compounds thus formed are new bodies, often bearing no resemblance in appearance or other properties to the elements which combine to produce them. Thus, water results from the combination of two gases.

The strength of chemical A. is different between different substances. Sulphuric acid combines with lime, and forms gypsum; but if potash is added, the sulphuric acid leaves the lime, and combines with the potash. As a sort of choice is here manifested, it is called a case of *elective* A. These elective affinities, however, are often altered by a change of temperature, or other accompanying circumstance.

AFFIRMATION, a solemn declaration and asseveration made before an officer competent to administer an oath and admitted in lieu of an oath from those who profess conscientious scruples as to the permissibility of swearing. In most of the United States a witness may, at his own option, either swear or affirm, and with the same legal effect.

In the act of affirming the right hand is raised while the formula is spoken. In England affirmation as a substitute for swearing was first permitted in the case of the Quakers. A later statute has extended the privilege to all persons who refuse to be sworn from conscientious motives, and that of 1869 extended the right of making an affirmation in a court of justice to all on whose conscience an oath would not be binding. See **OATH**.

AFFO, IRENEO, 1741-1800; an Italian writer who left numerous works on history and antiquities; also literary and political works. He was eminent as a philologist.

AFFORESTATION (from *ad* and *forest*), the act of converting open or partially wooded ground into forest or woodland. William the Conqueror and other early Norman kings afforested large districts for the purpose of obtaining game preserves.

AFFRE, DENIS AUGUSTUS, archbishop of Paris, who fell in the insurrection of June, 1848; b. 1793. At the time of the restoration he was professor of theology at the seminary of St. Sulpice; and on account of his prudent and temperate character, was made archbishop of Paris by the government of Louis Philippe in 1840. Though not yielding a blind submission to all the measures of the government, he abstained from all offensive opposition. When Louis Philippe became an exile, and a republic was proclaimed, the archbishop kept aloof from political strife, but displayed earnest care for the public welfare. During the insurrection at Paris, 1848, he climbed upon a barricade in the Place de Bastille, carrying a green bough in his hand, as a messenger of peace, and wished to persuade the insurgents to lay down their arms. He had scarcely uttered a few words, when the insurgents and the troops commenced firing again, and he fell, mortally wounded by a musket-ball, coming apparently from a window above. He was carried by the insurgents into the house of a priest, and the next day was removed to his palace, where he died, June 27, 1848. He was the author of several theological writings, and of a work on Egyptian hieroglyphics.

AFFRIQUE, SAINT, a town of the dep. of Aveyron, France, on the Dourdon, 37 miles east of Albi. It is the capital of an arrondissement, is situated in a beautiful valley, between two mountains, and is surrounded by meadows, orchards and vineyards. The streets are broad, but the houses are mostly old and mean. It has woolen and cotton manufactories and tanneries. There is a considerable trade in wool, and a principal article of trade is the celebrated *Roquefort cheese*, made from ewe-milk, chiefly in the mountain pastures around the neighboring village of Roquefort. Many thousands of cheeses are made annually, and are kept in cellars by the cheesemongers to ripen. The town successfully resisted the Prince de Condé in 1628. Pop. about 5000.

AFFRONTÉE, as a term of heraldry, applied to animals represented front to front, or facing the spectator directly, as the lion in the royal crest of Scotland. Its opposite term is *addorsed*, or back to back.

AFGHAN, a bright colored blanket or covering of worsted.

AFGHANISTAN, the land of the Afghans, formerly known by the names of Drangiana and Ariana, lies between lat. 29° and 39° n., and in long. from 62° to 73° e. Afghanistan is a Persian name; the inhabitants style themselves *Pushtaneh* (plural of *Pushtu*). Their country is bounded on the n. by Turkestan; on the e. by a British sphere of influence, determined 1893-95; on the s. by Beloochistan; and on the w. by Persia. The pop. is variously estimated at from four to nine millions. In the n.e., the alpine region of the Hindu Kush, a wild mountain isthmus cleft by numerous ravines, and towering up into the clime of perpetual ice, unites the high masses of land in eastern with those in western Asia, and presents formidable obstructions to communication between the territory of the Oxus and that of the Indus. In the e., the Suliman mountains abruptly divide the country from the flat regions of the Punjab and the plains of the lower Indus. There are only two passes leading through the highlands of A. to the Indus: that in the n., formed by the deep valley of the Cabul river, has strong positions of defense at Jelalabad and Peshawur, not far from the Khyber pass; while that in the s., the Bolan pass, forms a way of communication with Sindh. The Hindu Kush and Ghor mountains, which continue the range westward, forming the Paropamisus of the Greeks, have been little explored. The elevated terraces of Cabul and Ghiznee slope gently down towards the s.w. Though the climate has generally a continental character, yet the differences of elevation and unequal distribution of water render it various. The date-palm ornaments the oases in the sandy desert to the s.w., and in the deep sheltered valleys of the e. the cultivation of cotton and sugar succeeds; but the high terraces of Cabul and Ghiznee (8000 to 9000 ft. above the level of the sea) are exposed to a severe winter, with heavy falls of snow. The vine flourishes here in company with apricots, apples, pears, plums, cherries, and fields of European corn. Tulips, aromatic herbs, rhubarb, tobacco and asafetida are extensively grown; and in the well-watered valleys, pomegranates and oranges, with a profusion of roses, display the luxury and splendor of an Indian clime. A. is rich in minerals; iron and copper especially are abundant.

The Afghans are generally powerfully made; and though the features of the men may be styled harsh, the cheek-bones being high, and the nose very large, they are often

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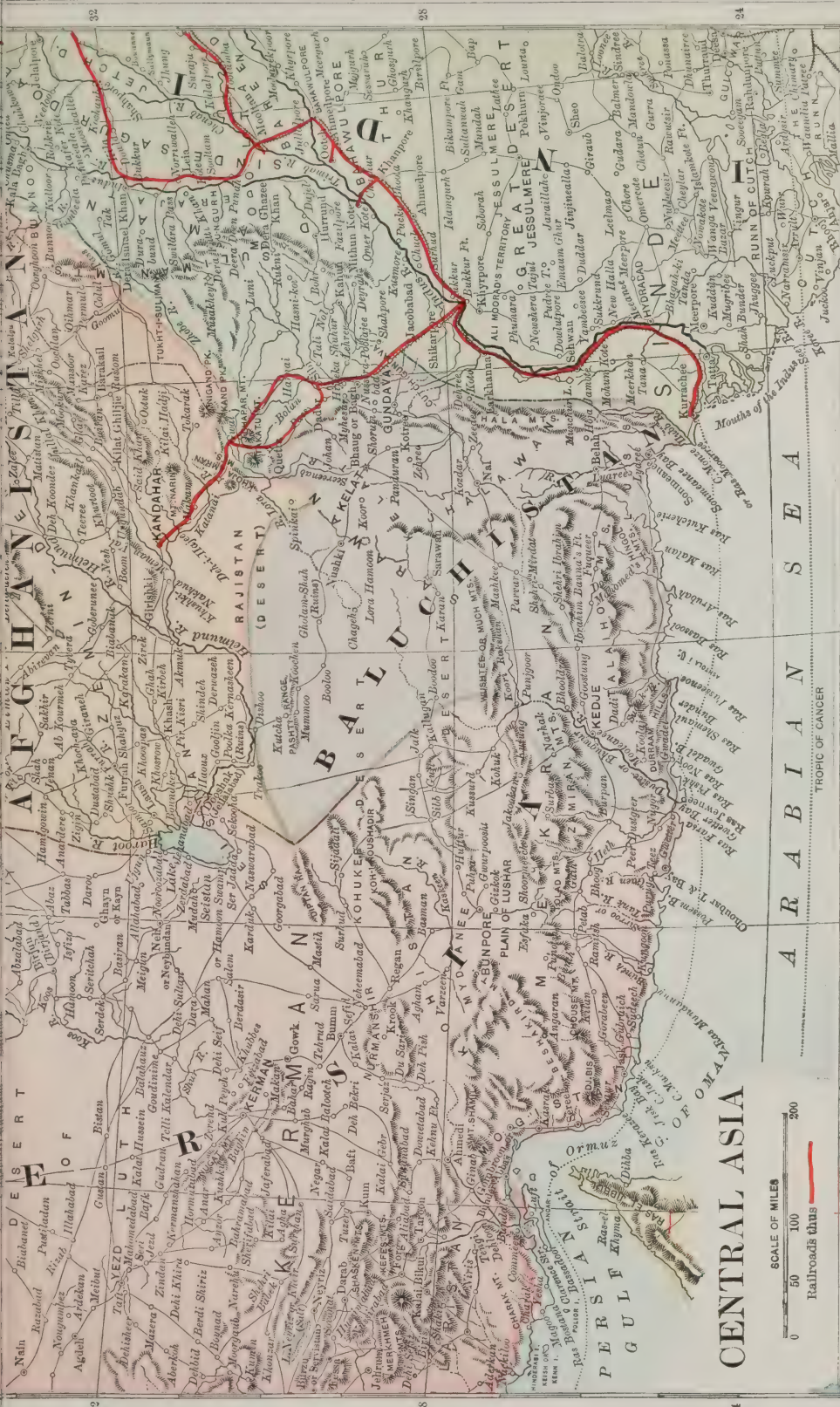
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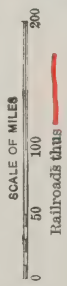
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expressive of candor, earnestness, and deliberation. The position of the Afghan language among those of the Indo-Germanic branch has been much discussed. A recent writer on the subject, Dr. E. Trump, says it is Indian rather than Iranian. The only authors in the Pushtu language are lyrists and ballad-writers, but the Persian is employed in prose composition, and the Persian authors are familiar to the educated Afghans. In religion they are Mohammedans according to the version of the Sunnites, and are strongly opposed to the Persians and the Sikhs, who belong to other sects.

The Afghans have been identified with the inhabitants of a hilly country on the western slope of the Soliman mountains, mentioned by Herodotus. In the 11th c. they are referred to as a small clan in the same district, who, since that period, seem to have assimilated and absorbed populations surrounding them. They first appeared as an independent power during the internal discords of Persia after the death of Nadir Shah. Ahmed Khan, of the race of Abdalli (1747-73), took advantage of these feuds, and liberated A. from Persian rule. His success founded the Douranee dynasty. When his son Timur died, in 1793, a contest for the throne took place between the brothers Zemaun, Mahmud, and Shah Sujah, which ended in the success of Mahmud, who, however, was compelled to abdicate the throne in 1823, and died in 1829. The empire now fell into the hands of three brothers, of whom the oldest, Dost Mohammed, ruled at Cabul, the most important of the three divisions of the country, where he had a revenue of 1,400,000 dollars, and an army of 18,000 men. Still, the country was in an unsettled state; for Dost Mohammed was at war with Lahore in the e., and in the w. the Persians had invaded Herat. On the 1st of Oct., 1838, the governor-general of India (lord Auckland) declared war against A., on the grounds that Dost Mohammed had unlawfully attacked the British ally, Runjeet Singh; that the military operations of the Afghans had betrayed a hostile purpose towards India; and that Shah Sujah, as the rightful heir to the Afghan throne, had placed himself under British protection. The British forces advanced through the Bolan pass to Candahar, where Shah Sujah formally claimed possession of the country. On the 21st of July, the army encamped before Ghiznee, and after some hard fighting that fortress was taken. On the 7th of Aug., Shah Sujah, with the British forces, entered Cabul, and the conquest was regarded as complete. It was a gross mistake of the nature of the country and the character of the people. The land had been invaded, but was by no means conquered. Dost Mohammed had surrendered to the English; but his son, Akbar Khan, was actively engaged in a conspiracy, of which Sir Alexander Burnes and the envoy Macnaghten were not aware until it was too late. At the beginning of winter, when help from India was impossible, the outbreak took place at Cabul, when Burnes, Macnaghten and several British officers were slain. It was then agreed that the invaders should leave the country; while, on the other hand, Akbar Khan and his confederates stipulated to provide an escort, and make other necessary arrangements for the retreat. Depending on these promises, the British army left Cabul on the 6th of Jan., 1842, in order to return by the Khyber pass into India; but neither escort nor provisions were supplied by the Afghan leaders, and the severity of the season increased the misery of the retreat. The fanatical tribes of the districts harassed the flanks and rear of the army, and slew women and children as well as men. Out of a host of 16,000—or, if we include women and children, about 26,000—only one man (Dr. Brydon) escaped to carry the dismal tidings to Gen. Sale, who still held his position at Jelalabad. Almost against his own will, the new governor-general, lord Ellenborough, sent other forces into A. Gen. Nott marched from Candahar to Ghiznee, which was again taken after a slight resistance, and then proceeded to meet the army which, under Gen. Pollock, had marched through the Khyber pass to Cabul. Here the force of Akbar Khan was defeated and routed, and the place was as far as possible desolated. The English officers and their ladies who had surrendered themselves as prisoners to Akbar Khan were restored to liberty, and soon afterwards the troops marched back to India. It was believed now that the Afghans were deprived of all power to confederate against the government of India; but this conclusion was too hasty, for in 1846 they formed an alliance with the Sikhs against the British; and the disturbances in the Punjab were not quelled without several sanguinary engagements. After the decisive battle of Gujerat (Feb. 21, 1849), the Sikhs were forsaken by the Afghans, and Dost Mohammed, with about 16,000 men, fled over the Indus. After this period, Dost Mohammed devoted his attention almost exclusively to the consolidation of his dominions. He died in 1863, appointing Shere Ali, one of his younger sons, as his heir. At first, the choice was acquiesced in by the sixteen sons of Dost Mohammed, a large number of whom were governors of provinces; but disputes followed, which for many years kept A. in a state of anarchy. See CABUL. The British government of India had recognized Shere Ali at his accession, and when in 1868, after his long struggle with his brothers, he obtained possession of Cabul, and became *de facto* ruler of the greater part of A., direct assistance was given him to secure the position for which he had fought so hard. Sir John Lawrence, then Indian viceroy, sent him first two and afterwards four lakhs of rupees with 3500 stand of arms. The next viceroy of India, lord Mayo, met the Ameer in state at Umballa, in March, 1869. It was then explained to him that her majesty's government had no desire to interfere with the affairs of A., except to check civil war, and, by so doing, to secure the peace and prosperity of the country. This intimation was accompanied by another large present. In the same year, the Ameer conceived the

idea of invading Bokhara (q. v.) and attacking the Russians, but was restrained by English advice. After 1869, Shere Ali endeavored to secure tranquillity in A. He was alive to the strife that had been occasioned by intrusting power to relatives, and he endeavored to replace the members of his family as much as possible by strangers. He also indicated very distinctly that he did not intend to select as his heir his son Yakooob—who, at an early age, had shown great ability as governor of Herat, and had, on many occasions, given his father most valuable assistance—but a younger son, Abdullah. The claims of Yakooob to share in the government of A. were ignored, and the result was that, in 1870, he headed a rebellion against his father; but in the following year a reconciliation was effected through the intervention of England. In 1869, it was settled between England and Russia that all the provinces between the Oxus and the Hindu Kush should be treated as part of A. In 1878, in consequence of new Russian diplomatic relations to A., Shere Ali was invited to receive a British mission. The refusal of the Afghans to admit the mission, which had advanced to the mouth of the Khyber pass, led, after some fruitless negotiations, to war. Hostilities began by the forcing of the entrance to the Khyber towards the end of November. There was some severe fighting in the passes, but the invaders were everywhere successful. Before the end of Dec., Jelalabad was occupied without resistance, and Candahar a little later. Shere Ali, who had fled, died early in 1879; and Yakooob Khan, proclaimed Ameer, made peace in May. It was provided that there should be a British resident at Cabul, and that Britain should defend A. against foreign aggression, the Ameer receiving a subsidy. The Kuram, Pishin and Sibi valleys became British territory, and the Khyber and Michni passes came under British control. But in Sept. of the same year the revolted troops of the Ameer surrounded and attacked the British residency. The resident, Sir Louis Cavagnari, and his staff, with almost the whole of their Indian guard, were slain after a desperate but bootless struggle. Measures were immediately adopted by the Indian government for punishing the outrage. The Ameer abdicated his sovereignty; and, after some fighting, Cabul was reoccupied in the beginning of October. See GREAT BRITAIN.

AFIUM-KARA-HISSAR (*Opium Black Castle*), a city of Asia Minor, in the pashalic of Anatolia, 170 m. e. by n. from Smyrna. It stands near the Akar, partly on level ground, and partly on a rising ground among rocks. Above the city towers an isolated rock of 300 to 400 ft. in height, almost precipitous on most sides, and very steep on that by which alone it is accessible. The summit has in former times been fortified. The streets of the city are very narrow. Most of the houses are of stone, and well built. A great trade is carried on, the city being an entrepôt between Smyrna and Europe on the one hand, and Armenia, the countries on the Euphrates, and Persia on the other. The products both of Europe and the east are to be found in its markets. A principal article of trade is opium, produced in the neighborhood, and from it the city derives its name. There are here manufactures of felts, carpets, arms and saddlery. Pop. about 25,000.

AFRAGO'LA, a t. in Italy, 5 m. n.e. of Naples, noted for manufactures of straw goods. Pop. about 6000.

AFRA NIUS, LUCIUS, a Roman poet and orator who lived about 100 B.C., praised by Cicero and Quintilian for the excellence of his plays.

AFRICA, a continent of the eastern hemisphere, and the third in point of size of the great divisions of the globe, forms an extension of Asia, to which it has been attached since eocene times by the isthmus of Suez, and may be described as an irregular triangle, having its base on the Mediterranean and its apex at the junction of the Indian and Atlantic oceans. From Cape Blanco (37° 19' 40" n.) at Bizerta, Tunis, to Cape Agulhas (34° 51' 15" s.) in Cape Colony, its length, divided almost equally by the equator, is about 5000 miles. Its extreme breadth, from Cape Guardafui (51° 14' e.) on the Indian Ocean to Cape Verd (17° 32' w.) on the Atlantic, is about 4500 miles. Including Madagascar and all adjacent insular groups, its area exceeds 11,950,000 square miles, but its coast-line, which is broken by few projections besides capes Bon, Verd, Good Hope, and Guardafui, and by few indentations, is but little more than 15,000 miles in length. The most important gulf is that of Guinea on the western coast. The most important islands belonging physically to the mainland are Ierba and one or two others in the Mediterranean, Socotra, Pemba, Zanzibar, and Mafia on the eastern side, and the Bissagos group on the Atlantic side. Perm, Dahlak, and some other so-called islands in the Red Sea are coral reefs, pierced here and there by volcanic cones. The Comoros group, between Madagascar and Mozambique, Annabon, St. Thomas, Prince and Fernando Po in the Gulf of Guinea and Madeira, the Canary and Cape Verd archipelagos are all of volcanic origin. Madagascar and the outlying Mauritius, Réunion, and Rodriguez, are believed to be surviving fragments of a Miocene continent now submerged beneath the Indian Ocean.

Relief of the Land.—The interior is generally monotonous in character, and consists of two well-marked physical regions—a great southern tableland with a mean altitude of over 3500 feet, falling off toward the north to an elevated plain, with a mean altitude of about 1300 feet. Although there is an absence of vast Alpine regions, Africa has a greater mean elevation (1900 to 2000 feet) than either Europe (1000) or Asia (1650). The lowlands under 600 feet have their greatest extent on the northeast and west of the Sahara or Great Desert, including in the former instance the lower valley of the Nile.





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The rapid descent from the plateau to the northern plain is well illustrated by the Somerset (Victoria) Nile, which in its course of ninety miles between the Victoria and Albert Nyanza falls from 3800 feet to 1500 feet—no less than 2300 feet altogether.

Orography.—Several mountain ranges intersect the southern plateau, among them the Lokinga or Mushinga mountains running east and west, and forming a district divide between the headwaters of the Lualaba (Congo) and the streams flowing south to the Zambesi. Further north another important watershed, between the Congo and the Nile basins, is formed by the Ulegga range, and its northern extension along the west side of lakes Mwutan Nzighé and Albert Nyanza, with eastern spurs dominated by the lofty and apparently volcanic Mfumbiro (10,000) and Gambaragara (15,000) which intervene between the Mwutan Nzighé and Victoria Nyanza. East of this basin rise the double-peaked Kilima-Njaro (18,881) and Kenia (18,000 ?), the culminating points of the whole continent. Here the Aberdare range (14,000) runs south and north between Kenia and Lake Naivasha in the direction of lake Baringo, found by Thomson to be a small land-locked basin 3217 feet above sea-level, commanded on the northwest by mounts Chibcharagnani (12,000) and Ligonyi (14,000). The whole of this newly discovered highland region, where the native reports of still active cones, such as the Dunyé-M'buro or "Smoky Mountains" have recently been confirmed by Fischer, seems to merge through the Kaiffa hills northward in the Abyssinian uplands (10,000 to 15,000), which form the north-eastern limit of the great southern plateau. From this point the outer continental rim or coast-range stretches almost continuously through Gallarland, and along the eastern side of lake Nyassa, southward to the Nieuweveld system (8000 to 10,000) at the southern extremity of Africa. These eastern coast ranges, spoken of by the early Portuguese explorers, under the collective name of *Lupata*, may in some respects be regarded as forming, if not a backbone, at least the border-chain of one great continental highland system. The corresponding western coast-ranges are both much lower and less continuous, being interrupted by wide gaps in Damaraland, and especially on the northwest coast, between the Senegal river and Morocco. They terminate in the Cameroons (13,700), at the head of the Gulf of Guinea, and elsewhere often present the appearance rather of outer scarps than of ranges actually rising above the inner tablelands.

The Atlas system (8000 to 12,000), stretching in the extreme northwest between Cape Nun, over against the Cananis, and Cape Bon, over against Sicily, runs parallel to the Sierra Nevada on the opposite coast, with which it forms a distinct physical region. Sallust's remark that this part of Africa belonged physically to Europe, has been amply confirmed by modern research, which clearly shows that even in pliocene times, Mauritania was still connected with Iberia at the strait of Gibraltar, and with Italy through a north-eastern continuation of the Atlas, of which Pantellaria, Malta, Gozzo, Sicily, and the Lipari group are surviving fragments, while the Balkan peninsula merged southward in the now flooded plains was frequented by the elephant and other large African fauna. At that time the Mediterranean appears to have formed three distinct basins, with a common outlet to the Atlantic, not north as now, but south of the Atlas, through the depression still marked by the Kebir and Melchir sebkhas, and the valley of the river Draa. To this extent the Saharian region may have been flooded by marine waters, but that it ever, since eocene times, at least, formed an oceanic bed, as is often maintained, is an assumption that has been completely refuted by the measurements and geological researches of Oscar Lenz and other recent observers. We now know that the Sahara is a vast elevated plain, somewhat higher than the Soodan (see above), and that it consisted of well-watered and fertile lands, obliquely intersected by a great divide (the Tibesti highlands), whence flowed mighty streams, such as the Igharghar, north to the Mediterranean, the Messawara, south to the Niger, and others east to the Nile. In some of the pools lying along the sandy beds of these rivers, the crocodile still survives, while the elephant, as well as the camel, formed part of the Mauritanian fauna within the historic period. In fact, the Sahara was what the Sudan still is—a thickly peopled land, abounding in natural products, diversified with broad belts of tropical forests, arable tracts, and grassy steppes, according to the nature of the soil, and greater or less abundance of moisture. This is also the general character of the great southern tableland, which, like the northern plain, has also in the Kalahari its desert zone, both corresponding to the arid regions of other continents. In its *geological* constitution Africa presents the appearance of great stability and antiquity. Unlike those of other continents, the seaboard is subject to scarcely any movements of upheaval and subsidence, except on the northeast coast between the Nile delta, and the gulf of Sidra (an area of subsidence), and parts of the Moroccan and Red Sea coasts (areas of upheaval). Earthquakes are confined mainly to the Atlas, which belongs physically rather to Europe than to Africa, and igneous disturbances are restricted on the west side to the bight of Biafra (the Cameroons, Fernando Po, and other adjacent islets). But on the eastern side the volcanic system is much more highly developed, stretching from the Comoro Islands through Masai Land (Kili-Njaro, Kenia, Elgon, etc.), northward to the Danakil country, and the volcanic islets in the Red Sea. The lava-fields of the Masai plateau appear to be the most extensive on the continent and at many points present signs of recent activity. But elsewhere the old plutonic prevail over the more recent eruptive rocks, just as the older sedimentary do over the later

tertiary and quaternary formations. Both orders appear to be generally intermingled, and largely associated with semi-crystalline and metamorphic forms, such as the schists, gneisses, graywackes, and hornblendse, about Kilima-Njaro and many other places. The Kamasia mountain range (8000 to 9000) northeast of Victoria Nyanza, is essentially metamorphic (white striated feldspar, quartz, and black mica), while shales and flaggy sandstones form the geological basis of the east African carboniferous series, which extends in a narrow strip from near the equator continuously to the Cape. Hard granite forms the bed of the Orange river, and asbestos, soapstone, coal, iron, and copper were amongst the specimens collected by Farini in the Kalahari steppe. Metamorphic rocks, again, prevail in the Congo basin, where iron and copper ores also abound, and where plutonic systems succeed above Stanley Pool (Johnston). Syenite, and other granites, with old sandstones, are the characteristic features of upper Egypt and the Nubian steppe, while Abyssinia has also a granitic base underlying dolerites, trachytes, and crystalline slates. But here the eastern slopes, skirted or traversed by the great volcanic zone, are strewn with obsidian, pumice, and other recent lavas.

A great diluvial plain stretches from this region through Senaar southward to the crystalline slates, associated with magnetic iron ores of the Baginze slopes, about the source of the Welle. Even the Sahara, long supposed to be a recent marine basin, is characterized by the absence of late sedimentary rocks and marine fossils, and by the prevalence of old sandstones, quartz, and carboniferous limestones, largely disintegrated by weathering. It also abounds in rich saline deposits, forming a chief article of trade with the neighboring Sudan, which is distinguished by the almost total absence of salt, the prevailing formations here being crystalline rocks, granites, diorites, slates, gneiss, again associated with sandstones in the higher ranges. In the Kong uplands, the sandstones overlie the granites, which in the Teggele group (Kordofan), pass over to porphyries and syenites, with gneiss interspersed with extensive diorite and auriferous quartz veins. Gold, mined by the ancient Egyptians at Mt. Elba, Red Sea coast, occurs also in many other places, as in Upper Guinea, the lower Zambesi, and Transvaal; and gold dust has at all times formed a chief article of export. But iron and copper are the characteristic metals, ferruginous ores abounding almost everywhere, and copper in Namaqualand and the Congo basin, Dar-fertit, and many other places. The basin of the Vaal is one of the richest diamantiferous regions on the globe. In this southern region, granites and crystalline slates form the substratum of an extensive series of fossiliferous rocks, descending from the outer river (Nieuweveld) down to the coast in a series of terraces ("karroos"), which are baked clay in the dry season, but flowery and grassy meads in the wet season.

The *hydrographic* are drawn in bolder lines than the orographic systems. Here, also, a certain symmetry prevails, the two great southern basins of the Congo and Zambesi, balancing those of the Nile and Niger of the northern plain, while the secondary Orange and Limpopo in the extreme south find their counterparts in the Senegal and Draa of the Northwest. The Zambesi and Limpopo, together with the Rovuma, Juba, and a few other coast streams, flow to the Indian Ocean; all the others, together with the Cunene, Koanza, Ogoway, Volta, Gambia, Tensift, Muluya, and Mejerdah, to the Atlantic, either directly or through the Mediterranean. Nearly all are still entangled in the intricacies of the interior, hence are obstructed either along their middle or lower courses by formidable falls and rapids, such as the stupendous Victoria falls on the lower Zambesi, the Yellala and Isangala on the lower, and Stanley on the middle Congo; the so-called "Six cataracts," the Ripon, Murchison, and many others, all along the Nile above Egypt; the "Hundred Falls" of the middle Orange. Freest from these impediments are both the Niger and its great eastern affluent the Benue, which latter affords a clear navigable highway into the very heart of the Sudan. Here a scarcely perceptible water-parting, which might be easily canalized (Flegel) separates it from the Shari, which gives further access by water northward to lake Tsad, southeastward toward the Nile and Congo basins. In this still unexplored region, the Shari, with its numerous headstreams, approaches the Makua-Welle, which its discoverer, Schweinfurth, supposed to flow from the Monbuttu uplands northwest to the Tsad, but which the explorations of Lieutenant Van Gèle, in 1889, proved to be identical with the Mobangi, the great northern tributary of the Congo.

But apart from its great rivers, including the historic Nile, earliest seat of human culture, Africa possesses a magnificent equatorial lake system, elsewhere unrivaled except by the great North American lacustrine basins. These lakes are the crowning glory of modern African research, all having been revealed to science by English-speaking explorers (Livingstone, Speke, Grant, Burton, Baker, Stanley) since the middle of the nineteenth century. They are grouped toward the east side of the continent between 15° s. and 4° n. lat., and all stand on the southern tableland, draining seaward through the Zambesi (Nyassa, with outflow Shiré), the Congo (Tanganyika with intermittent outflow Lukuga), and the Nile (Alexandra Nyanza, Victoria Nyanza, Mwtan Nzigé, and Albert Nyanza, with outflow Somerset Nile). The Alexandra (Akanyaru) drains northeastward through the Alexandra Nile (Kagera), to the Victoria, next to Superior (33,500 sq. m.), the largest fresh-water basin (26,000 sq. m.) on the globe. The Shimiyu, another influent from the south, may be regarded as the farthest headstream of the Nile, which thus rises about 5° s. lat., flowing thence

northward to the Mediterranean for some 4300 miles, a course probably a few miles longer than that of the Missouri-Mississippi, the next longest in the world. Some confusion still prevails regarding the Albert Nyanza and Mwutan Nzigé, which were long taken as alternative names of a continuous sheet of water now known to form two distinct basins. Hence Mwutan Nzigé may be conveniently restricted to the southern, and Albert Nyanza still retained for the northern lake, which is nearly 2000 sq.m. in extent. The outflow of Tanganyika was also a somewhat doubtful point, until the surveys of Thomson, Hore, and Wissman made it quite certain that it drains westward through the Lukuga, at least intermittently to the Congo. This adds considerably to the drainage area of the Congo, which ranks next to the Amazon in volume, discharging probably as much water as all the other African rivers together (Reclus). Since its identification by Stanley with the Lualaba, its farthest headstream appears to be the Chambeze, an eastern feeder of lake Bangweolo, rising in 10° s. lat., 33° e. long., and giving to the Congo system a total length of considerably over 3000 miles.

The equatorial lake system is thus distributed among the three great fluvial basins of the Zambesi, Nile, and Congo. But scattered over the continent are several other lacustrine basins, varying greatly in size, which have no seaward outflow, but form independent, or, at all events, now isolated centres of inland drainage. By far the most extensive of these are lakes Tsad (Chad) and Ngami, symmetrically disposed on either side of the equator, and fed, the former by the Shari and Komadugu, the latter by the Tonka. Both vary greatly in extent with the wet and dry seasons, and there is good reason to believe that formerly both had emissaries, Tsad to the Benue-Niger, Ngami to the Limpopo basin. True Alpine lakes, such as those of the Swiss and Bolivian highlands, are represented only by the Abyssinian lake Tana (Tsana or Dembea, 6100 feet), which has an area of some 1200 sq.m. and a depth of over 300 feet. It is fed by numerous Alpine streams, amongst which is the Abai, farthest source of the Bahr-el-Azraq, or Blue Nile, which, after sweeping round the Abyssinian plateau, joins the Bahr-el-Abiad, or White Nile at Khartoom. Before the discovery of the great lakes, Tsana was considered by many geographers as the chief reservoir and farthest source of the main stream. The great oceanic and inland hydrographic systems of the continent may now be tabulated thus:

Seaward Basins.	Area in sq.m.
Nile.....	1,500,000
Congo.....	1,350,000
Niger.....	1,150,000
Zambesi.....	850,000
Orange.....	400,000
Limpopo.....	200,000
Senegal.....	160,000
Ogoway.....	150,000
Smaller basins and dried-up areas of seaward drainage.....	3,000,000
Total seaward.....	8,760,000
Inland Basins.	
Tsad.....	750,000
Ngami.....	320,000
Igharghar, Messawara, and other dried-up areas of inland drainage...	1,850,000
Total inward.....	2,920,000

Climate.—Above all the great divisions of the globe, Africa is distinguished by the general uniformity of its climatic phenomena, a circumstance due to its massive form and intertropical position. In the region approaching nearest to the northern or southern equinoctial lines, rain falls throughout the year, thanks to the opposing trade-winds, which, by neutralizing each other, often preserve the stillness of the atmosphere and enable the local vapors to condense and precipitate themselves on the spot. In the northern hemisphere, a zone of two wet seasons stretches from the equator to the 15° lat. In summer, copious showers are caused by the moisture-bearing s.w. winds; in winter, the northwest currents become in their turn the bearers of heavy rain-charged clouds to the southern plateau. But on both sides of the torrid zone, comprising about seven-tenths of the whole continent, the difference in the disposition of the winds causes a corresponding contrast in the rainfall. Here the trade-winds maintain their normal direction constantly, or with but slight temporary deviations. Blowing from the northeast in the northern, from the southeast in the southern hemisphere, they divert to the equator most of the vapors crossing their path, leaving elsewhere clear skies and arid lands. Thus it happens that Africa has two almost completely barren zones of rocks, gravels, marls, clay, and sand—the Sahara and Libyan desert in the north, Kalahari and other wastes in the south. This regular disposition of the climates is completed by the regular alternation of winds and rains in the zone of Mauritania and the Cape, both belonging to the region of sub-tropical rains which fall in the respective winters of each

hemisphere. Africa is thus disposed from north to south in successive gray and more or less intensely green belts, whose limits coincide in several places with the isothermals, or lines of equal temperature. The lines indicating mean annual temperatures of 68° and 75° F., traverse in the north the Mediterranean seaboard and the Sahara respectively; in the south, the Orange basin, and a zone stretching obliquely from Mozambique to the Cameroons; while the area of greatest mean heat (82° F.) is comprised within an irregular curve enclosing the upper Nile basin between Khartoom and the Albert Nyanza north and south, lake Tsad, and Massowah (Massawah), west and east. But, through defective or incomplete observations, the general temperature has often been exaggerated. Nevertheless, owing to the far greater accompanying moisture, these relatively moderate heats are far more oppressive than those of the Beloochistan coast and other drier regions where the glass constantly indicates 115° and even 120° F. and 125° F. For the same reason the climate, except on the Mediterranean, Saharian, Red Sea, and extreme southern coasts, is nearly everywhere malarious round the periphery of the continent—that is, on the low-lying and generally marshy coast lands between the outer rim and the sea. It is the same in the Chambeze, Malagarazi (Unyamwesi), Shari, and other inland districts, which are either constantly or periodically under water. But elsewhere, with due precautions, the continent cannot be regarded as insalubrious; and the Sahara, for instance, is distinctly a healthy region; although, owing to rapid radiation, the hot days are succeeded by cool and occasionally even frosty nights. The mean annual rainfall ranges from under 4 inches in the Sahara to 60 and 80 about the equator, and from 80 upward on the Guinea coast.

Flora.—The continuous forest growths are confined mainly to the vast equatorial regions between the upper Zambesi and Sudan, and to some isolated tracts about the Abyssinian plateau, in the Moroccan Atlas, all along the Guinea coast, about the middle Limpopo and Zambesi, and in parts of Masailand and the upper Nile basin. "From Sierra Leone to the river Ogoway, along the coast the one prevailing landscape is that of endless forest" (H. H. Johnston, *The River Congo*). In the extreme north, African and south European species intermingle with some local varieties, and here are found the olive, date, and cork, with seven other kinds of oak, besides the eucalyptus, introduced from Australia. Nevertheless, the graminaceæ are predominant, and vast tracts in Algeria and Tunis are covered with halfa (alfa), largely exported to England for paper-making. The papyrus still lingers in the upper Nile, although in the lower Nile, the lotus and other characteristic plants have been mostly replaced by cereals, cotton, tobacco, and other economic species. Beyond Egypt the date gives place to the düm (see Doom palm) and deleb palms, wheat and rice to durra; while in the forest regions of Sudan and Guinea, the prevailing species are the magnificent baobab (*Adansonia*), the banana, ebony, butter-tree, oil-palm, which yields the palm-oil of commerce, the musanga, mangrove, ground-nut, dragon-tree, acacias, mimosas and other gum trees, succeeded in Galla and Somaliland, by aromatic shrubs and the coffee shrub, supposed to take its name from the Kaffa country, south of Abyssinia. Another variety of this shrub is indigenous in Liberia, whence it has lately been introduced into Ceylon and other coffee-growing lands. Indigenous to Africa is also the cotton plant, which, like indigo, is widely cultivated in Egypt and Sudan, and which grows wild in many places as far north as 19° n. lat. But of all African floras, the most characteristic, as well as the richest and most diversified, is that of the Cape region south from the Orange river, consisting chiefly of grasses, shrubs, bushes, and lovely ferns and heathers, in greater variety than is found even in the richest European lands.

Fauna.—Africa is the peculiar home of the large fauna, many of which, owing to the absence of great mountain barriers, freely roam from one end of the continent to the other, without undergoing any special modification of type. Such, among the carnivora, are the lion, far finer than its Asiatic congener, and met everywhere, from the Atlas and Nubia to the Cape; the panther and leopard, but not the tiger; the hyena, fox, and jackal. The great herbivora are represented by the elephant, differing both from the Asiatic and from the smaller and now extinct Mauritanian variety, the rhinoceros, of which there appear to be at least three species, including the one-horned, now known to occur in Nubia and perhaps also in Wadai; the buffalo, also, in several varieties; the giraffe, elsewhere extinct, but here still ranging from north to south, a remark applicable also to the ostrich as well as to the hippopotamus, which, like the crocodile, frequents all the large rivers and lakes. Africa is also the special home of thegnu, and several other species of antelopes sometimes still met in countless herds on both sides of the equator. The monkey family is also spread over the whole continent, where it is represented by numerous types, including the small Barbary variety, the dog-faced baboon, the Galago lemur, the beautiful colobus of the eastern regions, besides the anthropoid chimpanzees and gorilla of the west equatorial districts. Peculiar also are such equidæ as the zebra, quagga, and pigmy Mauritanian ass, although the horse itself, like the camel, appears to have been re-introduced by the Arabs. Of land mammals there are altogether enumerated about 480 species peculiar to this continent, amongst which are 95 of the simian and 50 of the antelope family.

Equally distinct is the avi-fauna, which besides the ostrich, includes the secretary, ibis, guinea-fowl, weaver-bird, roller-bird, love-bird, waxbill, whydah, sun-bird, parrots, quail, and several other indigenous species. Reptiles and insects also abound, com-

prising the huge python, many poisonous snakes, termites, locusts, and two little winged pests highly destructive to domestic animals—the tsetse fly, which ranges from Mozambique to Senaar, fatal to the horse, camel, ox, and dog; and the donderobo, s. of Kilima-Njaro, which attacks the ass, goat, and sheep.

Inhabitants.—Recent authorities roughly estimate the population of Africa at about 130,185,000, 11 to the sq. m., a density slight when compared with that of Europe, but still considerable, regard being had to the great extent of absolute desert, forest, and other waste lands. According to the nature of the soil and of the climate, the population is distributed very unevenly over the surface, being massed somewhat densely in the Nile delta, in the upper Nile valley, and generally throughout the Sudan; less thickly over the southern plateau, and very thinly in the regions of Mauritania and Tripolitana; while large tracts, especially in the western Sahara, Libyan, and Kalahari wastes, are absolutely uninhabited. Of the whole number, only a small portion are recent immigrants from Europe, settled chiefly in the extreme north (Egypt and Algeria) and in the extreme south (Cape Colony, Natal, and the Boer states). The Semitic tribes of the north are intruders from Asia, some of which immigrated in remote or prehistoric times, for example the Himyarites in Abyssinia and Harar from South Arabia, some since the spread of Islam (over 30,000,000 nomad and other Arabs, chiefly along the Mediterranean seaboard, in western Sahara and central and eastern Sudan). All the rest, numbering about 95,000,000 altogether, may be regarded as the true aboriginal element. These are classed by Lepsius into two great physical and linguistic groups: Hamites in the north, Negroes in the south, meeting and intermingling in the intermediate region of Sudan. But this broad grouping is inadequate to explain the present conditions, for there are probably more than two indigenous stock races, and certainly more than two stock languages in Africa, while the races themselves are intermingled in the southern plateau quite as much as, if not even to a greater extent, than in Sudan. The Arabic term Beled-es-Sudan, “Land of the Blacks,” answers to our somewhat obsolete expressions, *Nigritia*, *Negroland*, which is commonly regarded as the true home of the black race. Certainly more ideal negro peoples—that is, ideal in their departure from the European standard—are found in Upper Guinea, for instance, and among the Bari and Shilluk Nilotic tribes, than amongst the Bantus, as the Negro or negroid peoples of the southern plateau are now collectively called. Viewed as a whole, the negro family presents as profound deviations within itself as do the Caucasian and Mongolic—that is, the two other great families of the eastern hemisphere. The deviations are even greater if, in the typical Negro group are to be included not only the aberrant Hottentots of the extreme southwest, but also the pigmy peoples, such as the Bushmen of the Kalahari steppe, the Obongos of the Gaboon, the Akkas, south of Monbutland, the diminutive Batwas, averaging only four feet three inches in height, discovered in 1886 by Dr. Ludwig Wolf in the Sankuru (Middle Congo) basin, and the equally small Wambutti dwarfs, encountered by Stanley in 1889.

These western Negritos, scattered sporadically over the southern tableland, seem to stand in the same relation to their taller neighbors as the eastern Negritos (Andamanese, Malayan Samangs, Philippine *Étas*, Javanese Kalangs) to their taller Papuan neighbors; whilst their languages, such as that of the Bushmen, abounding in, to us, unpronounceable sounds known as “clicks,” are said by some to form a sort of connecting link between articulate and inarticulate speech.

Radically distinct from these idioms is the Hottentot, which itself differs fundamentally from the Bantu, a vast linguistic family, current amongst nearly all the other peoples of the plateau, from the Ama-Khosas of Kafirland northward to the Wa-Gandas of the Somerset Nile and the Duallas of the Cameroons. This wonderful Bantu group, comparable in extent as well as in complexity of structure to the Aryan, Finno-Tartar, Athabaskan, and other widespread families in the other continents, gives a certain unity to the Bantu populations, who could not otherwise be distinguished by any hard-and-fast lines from their northern Negro and Negroid neighbors in Sudan. Here the diversity of speech is as great as is the diversity of types produced by immemorial interminglings with the conterminous Hamite peoples. But certain relatively large linguistic groups have already been determined, which have so far helped to diminish the prevailing confusion. Such are the *Mandingan*, with many branches in Senegambia, the *Sonrhai*, of Timbuctoo and the middle Niger; the *Fulah* and the *Hausa*, both widely diffused throughout western Sudan; the *Tibbu* (*Tedaga* and *Dasaga*), ramifying from s. Fezzan across the central Sahara to Kanem, Bornu (Kanúri), Wanyanga, and Dar-Fur (Baele and Zogháwa); lastly, the *Nuba*, of Kordofan and the middle Nile to the Egyptian frontier. All these, except the Tibbu, while differing radically from each other, seem to be essentially negro forms of speech, although the true Fulahs are not a Negro, but apparently a Hamitic people (Krause). On the other hand, the Nubas, hitherto supposed to be related to them, are now known to be true negroes, whose type is preserved in Kordofan, and greatly modified in the Nile valley (Keane). The recent researches of Nachtigal have also helped to determine the hitherto doubtful position of the Tibbus (the Garamantes of the ancients), who occupy the whole of eastern Sahara, from about 12° e. long., and whose true home appears to be the Tibesti highlands. Physically, they are not to be distinguished from their Tuareg (Hamite) neighbors, but the race has been gradually displaced southward to the Tsad basin, where their speech, fundamentally distinct from the Hamitic, has been adopted with consid-

erable modifications by the Kanuri, Kanembu, and other true Negro peoples. Other large Negro groups are the Batta, of Adamawa; the Nupe and Yoruba of the lower Niger; the Mosgu (Masa), south of lake Tsad; the Maba of Wadai; the Dinka, Shilluk, Bari, and Monbuttu, of the upper Nile and upper Welle; lastly, the Zandeh (Nyam-Nyam) and Fan, occupying most of the still unexplored region between Sudan and the Congo and Ogoway basins. All these appear to be true Negroes, except the Fans, who have in recent times reached the western coast about the equator, and who are described as quite distinct (Hamites ?) from the surrounding black populations.

The remainder of North Africa, except where encroached upon by the intruding Semites (see above), is the proper domain of the Hamites—that is, the African branch of the Caucasian family. Their physical type is essentially Mediterranean, often characterized by extremely regular features, and in places even by blue eyes and fair complexion (Aures uplands, Algeria). But their language bears no distinct relation to any other Caucasian form of speech, beyond a certain faint resemblance to the Semitic, sufficient to suggest a possible primeval Semitico-Hamitic organic tongue. It has a geographical range in the north analogous to that of the Bantu in the south, being spoken with great dialectic diversity by the Berbers (Imoshagh), in western Sahara (Tuaregs), and Mauritania (Shluhs, Kabyles, Mzabs), and in the east by the Gallas, Somalis, Masai (?), Afars (Danakil), Agau, and Bejas—that is, generally between the Nile basin and the eastern coast. But it is now extinct in Egypt, where Arabic is current, and where the old Hamitic speech is represented only by the liturgical language of the few surviving Christian Coptic communities.

In its inhabitants, as well as its natural history, Madagascar forms a region apart, the dominant Hovas of the central plateau, the Sakalavas of the west, and the Betsimisarakas of the east coast being either of pure or mixed Malay stock. The Malagasy language, also, which is spoken with a certain uniformity all over the island, is an outlying branch of the great Oceanic (Malayo-Polynesian) family, which stretches thence eastward to Easter Island. Nevertheless, there is evidently a considerable intermixture of black blood, due to the importation of slaves from the Mozambique coast, and possibly also to the presence of a Negro element in the island before the arrival of the Malay intruders from the eastern archipelago.

The subjoined is a general scheme of all the African races :

I. NEGRO AND NEGROID PEOPLES.

Negritos (Pigmies) :

<i>Bushmen</i> (San)	Kalahari desert.
<i>Batwas</i>	Sankuru river, Congo basin.
<i>Obongos</i>	Ogoway basin.
<i>Akkas</i>	South Monbuttuland.

Hottentots (Khoi-Khoi) :

<i>Namaqua</i>	Great and Little Namaqualand.
<i>Koraqua</i>	Upper Orange, Vaal, and Modder rivers.
<i>Griqua</i> (half-castes)	Griqualand west.

Bantus :

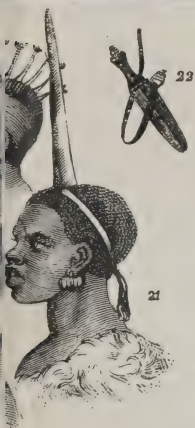
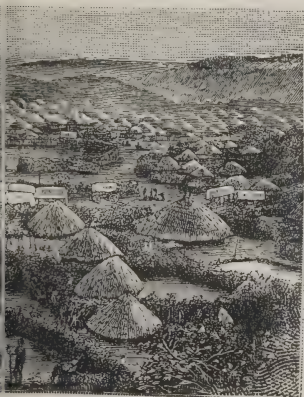
<i>Zulu-Kafirs, Basutos, Bechu- anas</i>	South from the Limpopo.
<i>Makua, Matabele</i>	Between Limpopo and Zambesi.
<i>Manganja, Waiyaru</i>	Lake Nyassa.
<i>Barotze, Barua, Balunda</i>	Between Zambesi and Congo.
<i>Wasuahili, Wanika, Wapo- komo</i>	East coast.
<i>Waganda, Wanyamwesi, Wal- egga</i>	Equatorial lakes.
<i>Oraherero, Ocampo, Bacongo, Bateke, Duallo</i>	West coast.

Sudanese Negroes :

<i>Kru, Fanti, Ashanti, Yoruba, Nupe</i>	Upper Guinea.
<i>Mandingan, Wolof, Bambara, Sonrhai</i>	Senegambia.
<i>Hausa, Batta, Kanuri Bag- hirmi, Mosgu, Kanem</i>	Central Sudan.
<i>Maba, Nuba, Dinka, Shilluk, Bari, Monbuttu, Zandeh</i>	Eastern Sudan.



AFRICA.—1. Bushwoman. 2. Senegambian. 3. Grain mortar. 4. Benguelan woman. 5. 11. Abyssinian woman. 12. Congo woman. 13. Guiloan. 14. Manganja. 15. war-dance. 20. Village in Zanzibar. 21. Uanyamwezi. 22. Somali dagger. 23. Zu



10. Inhabitants of Tripoli. 11. Slaves transported. 12. Bushman village. 13. Zulu musicians and their wives. 14. Fish-basket. 15. Slaves transported. 16. Bushman village. 17. Zulu musicians and their wives. 18. Bushman village. 19. Zulu musicians and their wives. 20. Inhabitants of Tripoli. 21. Slaves transported. 22. Bushman village. 23. Zulu musicians and their wives.

II. HAMITIC PEOPLES.

Mixed and Doubtful Hamites :

<i>Fans</i>	Ogoway basin, thence inland
<i>Fulahs</i>	West and central Sudan.
<i>Tibbus</i>	East Sahara.
<i>Agas</i>	Abyssinia.
<i>Masai</i>	Masailand.
<i>Fellahin</i>	Egypt.

True Hamites :

<i>Berbers</i> {	<i>Shluh</i>	Morocco.
	<i>Mzab, Kabyle</i>	Algeria, Tunis.
	<i>Tuareg</i>	West Sahara.
<i>Gallas, Somáli, Afar (Danákil),</i>		
<i>Bejas</i>	Northeast coast.	

III. SEMITIC PEOPLES.

<i>Arabs</i>	Mauritania, west Sahara, central and west Sudan.
<i>Hamyarites</i>	(Amhara, Tigré, Shoa).

Religion and Social Condition.—Speaking generally, the northern Hamites and Semites are Mohammedans and stock-breeders, the southern Bantus nature-worshippers and agriculturists; all these factors intermingling in the intervening zone of Sudan. The chief exceptions to this statement are the Christian Abyssinians (Monophysite sect); the Hottentots, who are mainly cattle-breeders; and the Algerian Berbers, who prefer tillage to pasturage. A nomad existence prevails in eastern Sudan; a settled, in central and western Sudan. Throughout the whole of this region Islam continues to encroach on heathendom; it is now firmly seated on the upper Niger and upper Senegal; it has already penetrated to various points of the Senegambian and Guinea coasts; it has spread with the conquering Fulahs to the southern limits of Adamáwa, and has crept down the east coast from Somáland to Zanzibar and Mozambique. Thus fully one-half of the continent has accepted its tenets, which have on the whole had a beneficent influence on the Negro peoples, by suppressing cannibalism and shaking their faith in the medicine man. Elsewhere progress is barred by the all-prevailing fetichism, intimately associated as it is with the baneful practice of witchcraft. Cannibalism, also, in its most repulsive forms holds its ground among the Monbutts, Zandebs, and Fans, a central zone of anthropophagy apparently traversing the continent from the west coast along the equator nearly to the great lakes, and stretching northward to the upper Shari basin. On the other hand, slavery, while maintained by Mohammedanism as a necessary social institution, has by the intervention of the European powers, almost ceased to be an object of foreign traffic. But the Arab slave-dealer continues to widen his sphere of action in the interior, and has recently come into collision with the pioneers of European civilization, toward the eastern frontier of the newly founded Congo State. Christianity has been introduced at various points, and has made some progress amongst the Basutos and some other southern Bantus.

Exploration.—The word “Africa,” of uncertain derivation, originally the name of a small tract on the n. coast still surviving in the *Frige* of the Tunisian Tell, was extended under Roman influences to the whole of the “dark continent.” It was the Ethiopia of Homeric and the Libya of later Hellenic times, terms vaguely applied to the region stretching away to the setting sun, and with undefined southern limits. But neither Greeks nor Romans ever extended their knowledge much beyond the northern verge of the Sahara. Exploration may be said to have begun with the expedition sent by Sankhara of the eleventh (Theban) dynasty to the land of Púnt (Somáland) as recorded on the Wady Hammamát inscription (2400 B.C.). After the circumnavigation attributed by Herodotus to Necho, son of Psametik I. (26th or Saïte dynasty, 620 B.C.), and the naval expedition of the Carthaginian Hanno round the northwest coast, perhaps to the equator (300 B.C. ?), little was done for the seaboard till the fourteenth century A.D., when the Dieppe mariners claim to have founded “Little Dieppe” on the Guinea coast (1364), and colonized the Canaries under Jean de Béthencourt, and when Italian navigators had coasted the northwest side as far as Bojador, as clearly shown on Marco Pizzigani’s sketch map (1367), now in the Parma library. Our general knowledge of the periphery was nearly completed toward the close of the next century, when Vasco de Gama doubled the Cape and skirted the east coast northward to Magadosho in 2° n. lat. (1497–98). But long before this the spread of Islam in the seventh century followed in the eleventh (1050–78) by the tremendous irruption of nomad hordes from s. western Asia, had converted the greater part of the northern plains into an Arab domain, which was revealed to science by the Arab writers of the next ensuing centuries. Thus a fair knowledge was acquired of their geographical, political, and ethnological relations in

the three physical zones of Maghreb (Mauritania), the Sahara, and the Soudan by the works of Edrisi (12th c.), Yakût, Abu'l-Hassan, and Ibn-Khaldûn (15th c.), the true pioneers of African exploration. Then followed 300 years of comparative inactivity, noted chiefly by the occupation of various points on the coast by the Portuguese, Dutch, and English. The Portuguese established relations with the powerful Bantu states of Congo on the west, and Monomotopa on the southeast side; the Dutch obtained a firm footing in the Hottentot country in the extreme south, while the English were attracted more especially to Guinea and Senegambia (Windham's voyage to Guinea in the sixteenth century, followed by the journey of Jobson and Thomson, and occupation of Cape Coast in 1664).

The modern epoch of geographical research, apart from political or commercial considerations, begins properly with James Bruce, who discovered the Abai source of the Blue Nile in 1770, and whose adventures in Abyssinia stimulated the foundation of the African Association (1788), which before the close of the eighteenth century had already sent out Ledyard, Lucas, Houghton, and Mungo Park to explore the Niger basin.

In the nineteenth century the most various motives have co-operated in favor of an extended knowledge of this vast continent. The captains of English cruisers, employed to suppress the slave-trade, have supplied some valuable information; the governors of the colonies and private merchants have contributed their share; and enterprising travelers from all sides of the coast have endeavored to strike out paths to the interior. The works published on Africa since the year 1800 are consequently very numerous. In 1802 to 1805 Lichtenstein traveled in the district north of the Cape of Good Hope, and first furnished information regarding the Bechuana tribe. The travels of Mungo Park from Timbuctoo to Bussa are familiar to every one. In 1809 Burckhardt was sent out by the African society, and his explorations, rich in manifold results, occupied the years 1812-1816. To the French we are indebted for much valuable information concerning Morocco, Algeria, and the neighboring parts of Sahara. The labors of Oudney, Clapperton, Denham, and Lander in the Sahara and Soudan are memorable by the discovery of lake Tchad and the course of the Niger. Since about 1840 our knowledge of South Africa has received many important additions from the missionaries stationed there, especially Moffat; while David Livingstone, who, from 1843 to 1873, was engaged in trying to open the countries north of the Cape of Good Hope, penetrated in 1849 as far as lake N'gami, in 20° s. lat.; and in 1853, ascending the Leeambye (Zambesi) northward for several hundred miles, succeeded in crossing the continent to Loando on the west coast. Having retraced his steps to the point of the Zambesi from which he had started, the adventurous traveler next followed that stream till he reached the east coast, at Quillimane, in 1856. From 1859 to 1863 was spent in various explorations of lake Nyassa and the neighboring regions. Again setting out in 1866, he found, in the region s. of lake Tanganyika, the river Chambezi. This river, which is specially known by this name ere it falls into lake Bemba or Bangweolo, is known between that lake and lake Moero as the Luapula, and farther on in its course as the Lualaba; and was by Livingstone traced through these lakes and as far as 4° s. lat. Livingstone's belief was that this basin, now known to be the upper Congo, contained the headwaters of the Nile. In 1871, along with Stanley, he found the river Rusizi flowing into the north of lake Tanganyika. His last enterprise consisted in further exploration of these regions, and new efforts to find the Nile sources. He died at Ilala, beyond lake Bemba, in May, 1873. Burton and Speke, crossing the Border mountains from Zanzibar, in 1857, discovered lake Tanganyika; and the former, then journeying to the northeast, discovered the southern part of the great Victoria Nyanza, which he supposed to be the head reservoir of the Nile. A second expedition, undertaken by Speke and Grant in the end of 1860, penetrated as far north as Gondokoro on the White Nile, and added vastly to our knowledge of the eastern equatorial regions of Africa. At Gondokoro, Speke and Grant were met by Mr. (Sir Samuel) Baker. Baker, accompanied by his heroic wife, pushed on to the south, and discovered, in 1864, west of the Victoria, another great lake, which he called the Albert Nyanza. He returned in Sept., 1873, from a second expedition—of a military character—undertaken in 1869, at the expense of the pasha of Egypt, to suppress slavery in the upper regions of the Nile. The geography, language, and manners of the inhabitants of Abyssinia, Senaar, and Kordofan have also during late years been greatly illustrated by the efforts of various European travelers. The researches of Drs. Barth, Nachtigal, and others (1850-1874)—investigating the same central division of the continent as Clapperton and Denham—and Dr. Schweinfurth's travels (1868-1871) in unexplored regions, have enriched our store of knowledge regarding this land of mystery. In 1874-5, Lieut. Cameron surveyed the lower half of lake Tanganyika, and walked across tropical Africa from east to west, all but determining the source of the Congo. Next came Stanley, who after exploring the Shimiyyu, farthest southern headstream of the Nile, circumnavigated Victoria Nyanza, and discovered the Mwtan Nzighé, which he took for Baker's Albert Nyanza, but which is now known to be a distinct basin, draining possibly to Tanganyika (1875-76). Then striking the Lualaba at Nyangwe in the end of 1876, he forced his way down the stream, and arriving at the mouth of the Congo in the autumn of 1877, demonstrated that the Lualaba and Congo are identical. In 1877-79 Serpa Pinto crossed from Benguela to Durban in Natal. In 1880 Mr. Joseph Thompson explored the route between Nyassa and Tan-

ganyika : and in 1884 he made his memorable journey from Mombasa by Kilima-Njaro and Kenia across Masailand to the Victoria Nyanza. In 1884 Mr. H. H. Johnston ascended the main peak of Kilima-Njaro to a height of 16,200 feet. Dr. G. A. Fischer, in his attempt to reach Emin Pasha, reached north to lake Baringo (1885-86). In 1885 Grenfell discovered the U-banghi, the great northern tributary of the Congo, which he navigated to within 200 miles of the farthest point reached by Dr. Junker (22° 40' e. long.) penetrating westward down the Welle-Makua (1886). It thus seems all but certain that Schweinfurth's Walle flows not to lake Tsad through the Shari, but through the U-banghi to the Congo.

In 1887 Emin Pasha (q.v.) reported by letter repeated exploration of the Albert Nyanza (q.v.). Meanwhile Stanley's expedition was on its way to the Congo to rescue him. This last expedition of Stanley, extending over the period June, 1887-Dec., 1889, and performed at great expense of lives and money, resulted in the discovery of a south-western extension of lake Victoria Nyanza reaching to within 155 miles of lake Tanganyika; also that the Albert Edward and Albert Nyanza lakes are connected by the Semliki river, and in the identification of the Ruwenzori range, with the "Mountains of the Moon" of the old maps. The intricate water-system south of the Middle Congo has also been unraveled, especially by Pogge, Wissmann, and Ludwig Wolf (1881-86), who have made it evident that the Kwango, Kassai, Sankuru, and lake Leopold, all belong to one magnificent hydrographic system flowing through the Kwa to the Congo at Kwamouth, and including Livingstone's Kassabi (1854). It was on the Sankuru that Dr. Wolf made the acquaintance of the pigmy Batwas, the smallest known race of mankind. The Ogoway system, first discovered by Du Chaillu (1850), ascended by Walker to Lope (1873), and surveyed by Compiègne and Marche to Ivindo (1874), has been completely elucidated by De Brazza, Mizon, and Rouvier during various expeditions between 1877-86. The Alima, supposed to be one of its head-streams, has been followed to the right bank of the Congo; and the Ogoway itself, reported to be one of the great continental basins, proves to be a coast stream of secondary importance. After visiting it in 1874, Dr. Oscar Lenz transferred the scene of his operations to the north, crossing from Morocco to Timbuctoo in 1880, and doing excellent surveying work on the route across the western Sahara. The same route had been followed by Chaillié in 1828, himself preceded (1826) by Laing from Tripolitana, and followed by Barth (1853), these, besides Mungo Park, being the only European travelers that have reached the "Queen of the Desert" during the present century. Again moving southward, Lenz ascended the Congo to Nyangwe, and crossed the continent from the mouth of that river to the Zambesi delta in seventeen months (1885-86). He had been preceded altogether by nine others—Livingstone, Loanda to Quilimane, 1854-56; Cameron, Zanzibar to Benguela, 1873-75; Stanley, Zanzibar to Congo mouth, 1874-77; Serpa Pinto, Benguela to Natal, 1877-79; Matteucci and Massari, Suakin to Niger delta, 1880-81; Wissmann, Loanda to Zanzibar coast, 1881-82; Arnot, Natal to Benguela, 1881-84; Capello and Ivens, Mossamedes to Zambesi delta, 1884-85; Gleerup, Congo mouth to Zanzibar, 1884-86.

The headwaters of the Lomami, one of the great southern tributaries of the Congo, were visited in 1889 by Alexander Delcommune, a Belgian, and in that same year Dr. Zintgraff made an expedition into the interior of the Cameroons.

These have all been routes from east to west or west to east, no one having yet succeeded in crossing the continent along the line of the meridian from north to south. In 1886, Dr. Holub attempted the route from the Cape northward, and in 1887 had penetrated farthest in this direction, having advanced some distance beyond the Zambesi. The regions that remain to be explored are chiefly : (1) The upper Zambesi and the space between that river and the headwaters of the Congo—that is, both slopes of the Lokinga water-shed. (2) The region between the Congo and equatorial lakes. (3) The much larger region between the Congo and Shari basins, and thence westward to the Bight of Biafra. (4) Most of Somáli, Kaffa, and Galla lands, especially between Thomson and Fischer's farthest n. and Schuver's farthest s.—that is, between 1°-10° n. lat., and stretching from the upper Nile to the Indian ocean. (5) Much of the region enclosed by the great northern curve of the Niger. (6) The Libyan desert.

The Partition of Africa.—In 1890-91, by various compacts between England, France, Germany, and Portugal, such desirable portions of Africa as had not previously been claimed by other nations, were divided among these four powers. This territorial division did not take, in the case of all territories, the form of actual annexation; but rather in the mapping out of the country into "spheres of influence," within each of which only the power to which it had been assigned should thereafter be paramount. These spheres of influence are of somewhat indefinite extent; and in the case of the Anglo-Portuguese division, there still remain territories that are in dispute. The new arrangement and general partition are indicated in the maps of AFRICA and CENTRAL AFRICA. See also the articles CONGO FREE STATE, GERMANY, GREAT BRITAIN, HINTERLAND.

The ANGLO-GERMAN AGREEMENT was signed July 1st, 1890, at Berlin, by the German Chancellor and the British Ambassador, and consists of 12 articles. In return for territorial concessions by Germany in Africa, England in the twelfth article cedes to Germany the island of Heligoland (q.v.) in the North Sea.

The ANGLO-FRENCH AGREEMENT was signed at London, Aug. 5th, 1890, by Lord Salisbury and the French Ambassador. It consists of two declarations. In the first, France recognizes an English protectorate over Zanzibar and Pemba, and, in the second, England recognizes a French protectorate over Madagascar, and establishes the French sphere of influence from Algiers, south, to a line from Say on the Niger to Lake Tsad. The native government of Madagascar refused to recognize the French protectorate, and in 1895 France sent an expedition to enforce it. In January, 1896, Madagascar became a French dependency.

The ANGLO-PORTUGUESE AGREEMENT is based upon a convention made on August 20th, 1890, and further modified on Nov. 14th, but the British South Africa Company asserts a right to considerable territory south of the Zambesi and west of Sofala, including Mashonaland and Manica, over which Portugal claims exclusive jurisdiction.

The respective shares of the European powers in Africa are hard to determine, because they change from year to year. The extent of unappropriated territory is rapidly diminishing and now comprises about 1,500,000 square miles. The following are rough estimates in square miles of the African possessions of European states:

Portugal	900,000	Congo Free State (Belgian)	850,000
Spain	250,000	Italy	600,000
France	3,500,000	Great Britain	2,250,000
Germany	890,000		

Bibliography.—See Bunbury, *History of Ancient Geography* (1880); Barth, *Travels* (1857); Burton, *Lake Regions of Central Africa* (1860); Kraff, *Travels* (1860); Livingstone, *Travels* (1860), *Expedition to the Zambesi* (1865), and *Last Journals* (1874); Baker, *Albert Nyanza* (1866), and *Ismailia* (1874); Schweinfurth, *The Heart of Africa* (1874); Cameron, *Across Africa* (1877); Chaillé-Long, *African Travels*; Holub, *Seven Years in South Africa* (1881); Thomson, *To the Central African Lakes and Back* (1881), and *Through Masai Land* (1885); also Cust, *The Modern Languages of Africa* (1883); Rowley, *Religions of the Africans*; Rohlf, *Climatology and Hygiene of East Africa*; *Artes Africae* (Industrial Arts of Central Africa); Smith, *Zoology of South Africa* (1837); Gordon Cumming, *A Hunter's Life in South Africa* (1850); *Catalogue of Fossil Reptilia of South Africa* (pub. by British Museum); Lambert, *The Fishes of Zanzibar*; Harvey, *Thesaurus Capensis* (Flora of South Africa); Oliver, *Flora of Tropical Africa* (1868). For the recent political divisions, see the *Statesman's Year Book* for 1891 and 1892; Creswell, *Our South African Empire* (Lond., 1885); Little, *South Africa* (1884); Mohr, *Nach den Victoria Füllen des Zambesi* (1875); Pringle, *A Journey in East Africa* (1886); Roche, *On Trek in the Transvaal* (1878); Mackinnon, *South African Traits* (1887); Statham, *Blacks, Boers, and British* (1881); Mackenzie, *Austral Africa* (1889); Stanley, *How I Found Livingstone* (1872); id., *Through the Dark Continent* (1878); id., *The Congo and the Founding of its Free State* (1885); id., *In Darkest Africa* (1890); Petermann and Hassenstein, *Inner Africa* (1863); Trollope, *South Africa* (1878); Serpa Pinto, *How I Crossed Africa* (1881); Baines, *The Gold Regions of South Africa* (1877); Du Chaillu, *Equatorial Africa* (1861); id., *The Aspingi Kingdom* (1870); Arnot, *Garenganze* (1889); Blyden, *Sierra Leone and Liberia* (1886); Horton, *Climatology and Mineralogy of West Africa* (1888); Fischer, *Mehr Licht im Dunkeln Weltteil* (1885); Johnston, *Africa* (1878); id., *Kilimanjaro* (1885); Schmidt, *Sansibar* (1885); Latimer, *Europe in Africa in the XIX Century* (Chicago, 1895).

AFRICANDER, or **AFRIKANDER** is a name given to children born of European parents in South Africa.

The **AFRICANDER-BOND** is an association whose aim is to increase the political influence of the Dutch population in South Africa. It first came into prominence after the war in the Transvaal (q.v.)

AFRICAN INTERNATIONAL ASSOCIATION, founded in Belgium under the following circumstances: In 1876 the King of Belgium had called a conference of geographers and explorers of all nations in his palace at Brussels. He opened the congress in person, pointing out the growing interest taken in the civilization and exploration of Africa, advocating a closer union between all explorers for the furtherance of their common efforts, and suggesting the organization of stations for scientific purposes at the boundaries of the unexplored parts of Africa. An international commission was accordingly established, with the king as its president. They concluded that the best way to bring Africa in communication with the world was to pierce straight across from e. to w. and leave settlements along the line. This line was established in s. Africa, about 450 m. from Zanzibar. But in Aug., 1877, Stanley concluded his march of 6900 m. from the e. to the w. coast of n. Africa, and arrived at the mouth of the Congo with the discovery that that river was the most magnificent waterway on the continent. For a distance of 115 m. from its mouth it was open to the largest steamers; a second section of 250 m. was not navigable, owing to rapids and cataracts, but beyond Stanley Pool it presented an unbroken waterway for over 1000 m. through a rich and populous country. Stanley declared that whatever power could possess itself of the river would absorb the trade of the whole of the enormous basin behind, which extends across 13 degrees of longitude and covers 14 degrees of latitude. A new conference of geographers, explorers, and capitalists was convened, 1878, at Brussels, resulting in the formation of the A. I. A., under the presidency of the King of Belgium, for the purpose of opening this great

waterway to European commerce. A series of exploring stations were to be established, and a road was to be built along that portion of the river which was unnavigable, so as to connect the two navigable sections. The King of Belgium subscribed \$250,000 per annum out of his own private purse for the prosecution of the work. Through the energy of Stanley great progress was made, and in the spring of 1882 the members of the association practically had the vast field of industry all to themselves. But meanwhile complications had arisen. The Portuguese government revived certain ancient territorial claims to all the w. coast of Africa between 5° and 8° s. latitude. These claims, which had been practically abandoned before the announcement of Stanley's discoveries, were based on discovery, possession, and treaties with the natives and with European powers. At the same time the French government entered upon a scheme for buying up territory from the natives, and M. de Brazza appeared on the banks of the Congo distributing tricolor flags, and asserting that he had obtained from their recipients the cession of tracts and territory to France. The Dutch nation claimed possession of the lower part of the river by virtue of the trading posts that they had established there. Angry disputes arose. At length it was decided, by the mutual consent of all the great powers, including the U. S., to leave the final adjustment of the difficulties to an international conference in Berlin. The conference opened at Berlin, 1884, Nov. 17, with Prince Bismarck in the chair, and ended its labors, 1885, Feb. 26. Fifteen states were represented. As a result of mutual compromises, it was declared that the immense regions forming the basin of the Congo river and its tributaries shall be neutral territory, that perfectly free trade shall exist there, that citizens of any country may undertake every species of transportation within its limits, that the Powers exercising sovereign rights over neighboring territory are forbidden to exercise monopolies or favors of any kind in regard to trade, and that they shall bind themselves to suppress slavery. The King of Belgium was made sovereign of the new state. See CONGO FREE STATE.

AFRICAN LANGUAGES. Many classifications of the native languages of Africa have been made at various times by those who have endeavored to study them comprehensively. Among these the most noteworthy (until 1880) was that of Mr. Prichard, as follows :

- I. Dialects of Negro-Land.
- II. Syro Arabian (Hebræo-African), including the Libyan and Atlantic peoples from Mt. Atlas to the Arabian Gulf ; and the Galla and tribes east and south of Abyssinia.
- III. Bântu.
- IV. Hottentot-Bushman.

A more satisfactory and scientific division is that of Prof. F. Müller, set forth in his *Universal Ethnology*, and adopted by Mr. Cust in his valuable *Modern Languages of Africa* (1883).

Prof. Müller had the advantage of being deputed as a member of the Scientific Expedition of the Austrian frigate *Novára*, and in the linguistic portions of the *Report* of that expedition, in his *Universal Ethnology*, and *Outline of Philology*, he goes over the whole subject of the ethnology and languages of the world. His classification of the African languages is the following :

- I. Shemitic.
- II. Hamitic.
- III. Nuba-Fulah.
- IV. Negro.
- V. Bântu.
- VI. Hottentot-Bushman.

The marking off the third additional division is the special feature of this classification, which removes a great many difficulties.

Lepsius, in the preface to his *Nuba Grammar*, published in 1880, gives us the result of lengthy investigation and long experience. It is diametrically opposed to the results at which F. Müller arrived. Why he delayed so long the publication of this work is not clear. Setting the Semitic on one side, as obviously intruders from Asia, he considers the Hamitic and Bântu elements as the sole factors, since the Hottentot-Bushman must be included in the Hamitic subdivision, and the great Negro intermediate zone is the diversified product of the collision and mutual influence and mixture of the Hamitic and Bântu. In very much of his argument he appears to follow Bleek, Logan, and those who preceded him chronologically, in enunciating such views ; but no one has worked them out so fully as Lepsius. In his *Standard Alphabet*, published in London and Berlin (1862), he made a general division of languages upon another principle, the main feature being the existence or absence of literature, which is not a permanent barrier, as in one generation a language passes under proper culture from being unwritten, to becoming the vehicle of a copious literature ; but to this division, based upon a transitory characteristic, he unites another, the existence or the contrary of grammatical gender, one of the most deep-rooted of all divisions.

WRITING.—The use of a written character, and the necessity for it, imply a degree of civilization to which the majority of the inhabitants of Africa have never risen.

And yet to Egypt the world is indebted for the one alphabetic character, which in different forms has become the property of civilized mankind. When, therefore, one states that, so to speak, there are no written documents to record the past in Africa, one is reminded that in Egypt the most ancient documents in the world have been conserved. It will be convenient to notice each division of the subject separately.

In the Semitic family some Phenician inscriptions have survived in Egypt and the North of Africa. The Arabic character is used exclusively throughout the North of Africa, in a peculiar form called the Maghribi; through the central tracts it is the medium of religion, commerce, and social intercourse to the Mahometans; and far to the South is used by the Malay immigrants. The Mahometans of Shoa write the Amháric language in Arabic character. The Hurári use the same character for their language. The character used by the Arabs of the East Coast is an antiquated form, and most unsuited to the sounds of the Swahili language. In Bornu the Arabic alphabet is called *El Warash*. The written characters of the old Ethiopic, or Giz, and that of the Amháric are a Syllabary, read from left to right, which change was wrought under Greek influence. There are seven orders of letters of separate form to represent the consonant and vowel. The Amháric has some additional characters. D'Abbadie states that they amount to at least two hundred and sixty-seven varieties. The same character is used for the Tigré, and has been adopted, perhaps unwisely, for some of the Hamitic languages.

In the Hamitic group we have among the written characters no longer used, the celebrated Hieroglyphic, Hieratic, Demotic, and Coptic, the three former being at one and the same time ideographic, syllabic, and alphabetic, and the last alphabetic only. Nothing more need be said of these here. Of the old Libyan or Numidian form of writing, specimens are found in inscriptions brought casually to light and not yet satisfactorily interpreted. It is the mother of the existing local character called the Tifinag, the language being called Tamáshek, and the tribe using it the Tuwárik of the Sahára, a subdivision of the Berber family. Oudney first noticed them in 1822. Richardson, the African traveler, drew attention to them in 1847, and an account by him was published by the British Foreign Office. In the highways of the desert are found blocks of stone entirely covered with this character. The Arabs were entirely ignorant of their meaning. In the houses are similar scribblings on the walls. Attempts have been made with some success to translate them. They are read from right to left, and form a syllabary. Hanoteau in his *Grammar of the Kabáil and Tamáshek Languages*; Halévy and De Sauley in the *Journal of the Asiatic Society of Paris*; Letourneux in the *Report of the Florence Oriental Congress*; Faulmann in his book on *Written Characters*, have noticed this character.

In the Nuba-Fulah group must be noticed the ancient Nubian written character in the ruins at Meroë and Napata in Nubia. No satisfactory interpretation has as yet been made, and the language employed is only presumed to be the ancient form of the modern Bishári. In one instance there is a Greek transcript. It is only provisionally grouped here; if proved to be the vehicle of a Hamitic language, it must be transferred to that group.

In the Negro group is one indigenous written character only, that of the Vei, on the West Coast near Cape Mount. Doálu Bukere, a native of the tribe, who had learned the Roman character, was the inventor of this character about the year 1834. The writing was afterwards used for Mahometan purposes; but in its invention Mahometanism had no share. It is quite original, independent both of the Arabic and the English character. It is syllabic, and there are upward of two hundred forms. Books have been written in it to a considerable number; but it has not been adopted by any Christian mission, nor is it likely to have a prolonged existence. It has been noticed by a great many writers, and has received a notoriety greater than it deserved. Forbes, Koelle, Freeman, Hanoteau, and Steinthal have all mentioned it; it must be recollected that, though the forms are original, the idea of a syllabary and an alphabet was borrowed from European sources.

AFRICAN METHODIST EPISCOPAL CHURCH. American Methodists from the beginning of their history, labored diligently for the conversion and elevation of colored people in the United States, both n. and s., thousands of whom are now in communion with the M. E. church. In 1816, a company of them, with the hope of being freer and more useful as a separate denomination, called a convention in Philadelphia, which organized the African M. E. Church. Richard Allen, who had been a Methodist minister for 17 years, was chosen bishop, and was ordained by five presbyters. A second bishop, Morris Brown, was elected in 1828, and a third, E. Waters, in 1836. The doctrines and, with some unessential modifications, the government of the M. E. church are retained. The church has continued to grow, and many of its preachers have been able men. The abolition of slavery, with the kindred changes that accompanied it, has greatly enlarged its territory and added to its members. In 1864, preliminary measures for a union with the A. M. E. Zion church were taken by both parties, to be ratified at the next meeting of their general conferences in 1868. The union, however, did not then take place. In 1876, a plan of union with the Independent Methodist Church was adopted, to be followed (it was hoped) by the admission of all the independent churches in Canada and the United States. The number of young men who are studying for the ministry is increasing. The *Christian Recorder*, the church newspaper, enlarged and improved, is

prepared entirely by colored men. An educational department has been instituted, and the effort to supply the schools with competent teachers of the African race will be diligently prosecuted. In 1896 were reported 4680 ministers, and 615,854 members.

AFRICAN METHODIST EPISCOPAL ZION CHURCH, a denomination which had its origin, in 1820, in the secession of the Zion Congregation (N. Y. city) from the M. E. Church. It was soon joined by other congregations. The next year the first annual conference met in N. Y., attended by 22 ministers, and reporting 1426 members. At first each annual conference appointed its president. In 1838 Christopher Rush was elected superintendent for four years. In 1847 there were two general superintendents, four annual conferences (Philadelphia, Boston, New York, and Baltimore), 75 traveling ministers, about 200 local preachers and exhorters, 5000 members, 50 churches, and many congregations without churches, located in 11 states, the District of Columbia and Nova Scotia. The general conference of 1864 voted in favor of a union with the A. M. E. church (q. v.), which, however, has not taken place. The doctrines are the same as those of the M. E. church. The chief officers, at first styled general superintendents, but now bishops, are elected for four years, and may be re-elected. At the general conference in 1876 measures were adopted preparatory to a union with the colored M. E. church. In 1896 were reported 2561 ministers, and 492,888 members.

AFZELIUS, ADAM, 1750-1836; Swedish naturalist, a pupil of Linnæus, whose autobiography he afterwards edited. He studied the flora of west Africa, 1792-94, and wrote many botanical papers for the Danish royal academy and the Linnæan society of London. Several species of *Afzelia* have been named after him.

AFZELIUS, ARVID AUGUST, 1785-1871; a native of Sweden; first a school-teacher, and then parish priest for near half a century. He wrote poems in 1811, and *Farewell to the Swedish Harp* in 1848; translated Icelandic sagas, and with Geiger edited *Swedish Folk Songs*. His most valuable work is a *History of the Swedish People*, completed in 1870.

AGADES, formerly a very important city of central Africa, but at present in a declining condition. It is the capital of Air or Asben (q. v.), and is built upon the eastern edge of a great table-land, at an elevation of not less than 2500 ft., in lat. 16° 33' n., long. 7° 30' e. It holds little intercourse with the northern cities, such as Murzuk, which, indeed, is never visited, except by pilgrims on their way to Mecca; but its merchants still frequent the markets of Katsena, Tasawa, Maradi, Kano and Sokoto.

AGADIR, or SANTA CRUZ, a seaport in northern Africa, on the Atlantic, 30° 27' n., 9° 36' e. It was the Santa Cruz of the Portuguese in the 16th c.

AGALACTIA (Gr. *a*, not, and *galacté*, milk), a want of the due secretion of milk. It may depend either on organic imperfection of the mammary gland, or upon constitutional causes. In the latter case, the secretion may often be excited by warmth and moisture, by the stimulus of the act of sucking, and if this fail, by the application of the leaves of the castor-oil plant to the breast.

AGAMA, a genus of saurian reptiles, the type of a family called *agamidæ*. The agamas are allied to the iguanas, and have a lax skin, which they have the power of inflating with air. None of them are of a large size. They are found in warm climates, and are of various habits, some of them living in trees, and others confined to the ground.

AGAMEMNON, son of king Atreus, and brother of Menelaus. After his father's death, he reigned in Mycenæ, and married Clytemnestra, by whom he had three children—Iphigeria, Electra, and Orestes, afterwards celebrated in the Greek drama. When Paris, son of the Trojan king, Priam, seduced and carried away Helena, the wife of Menelaus, A., with his injured brother, made a tour throughout Greece, exhorting all the leaders of the people to unite their forces in an expedition against Troy. Having gained their alliance, A. was appointed general-in-chief of the united forces assembled at Aulis in Bœotia, where they were delayed some time. In the following campaign against Troy, which forms the subject of Homer's *Iliad*, A. is described as a very stately and dignified character. After the fall of Troy, he returned home, taking with him Cassandra, the daughter of Priam. Shortly afterwards, he was murdered by Clytemnestra, aided by Ægisthus, in whose care he had left his wife and children. A tragical fate had always lowered over the house of A.; and the destinies of his children—Iphigenia, Electra, and Orestes—were the favorite subjects of the Greek drama.

AGAMEN TICUS, MOUNT, a hill in York co., Me., 4 m. from the sea; 673 ft. high; noted landmark for sailors. Its exact situation is 43° 10' 2" n. and 70° 41.2' w.

AGAMOGENESIS, reproduction without sex, a process of multiplication by division, budding, or gemmation, and the like, in which there is no union of sexual elements, but simply a more or less discontinuous growth. It is exceedingly common among the lower animals and plants, but is gradually replaced in the higher by the more specialized method of sexual reproduction. The term is synonymous with *Parthenogenesis* (q. v.).

AGANIPPE, a fountain in Bœotia, near Mt. Helicon, flowing to the river Permessus. The water was sacred to the muses, and gave poetic inspiration. There was a fabled nymph Aganippe, daughter of the river.

AGAPÆ were love-feasts, or feasts of charity, usually celebrated by the early Christians in connection with the Lord's supper. The name is derived from the Greek word *ἀγάπη*, which signifies love or charity. At these feasts, the rich Christians presented their poorer brethren in the faith with gifts, and all ate together, in token of their equality

before God and their brotherly harmony. The meetings were opened and closed with prayer; and during the feast, spiritual songs were sung. At first, a bishop or presbyter presided, who read a portion of scripture, proposed questions upon it, and received the various answers of the brethren. Afterwards, whatever information had been obtained regarding the other churches, was read—such as the official letters of overseers, or private communications from eminent members; and thus a spirit of practical sympathy was engendered. Before the conclusion of the proceedings money was collected for widows, orphans, the poor, prisoners, and those who had suffered shipwreck. Then the members embraced, and the feast was ended with a “philanthropic prayer.” As early as the 2d c., the custom of celebrating the A. and the Lord’s supper together had ceased, on account of the persecutions. Justin, when writing on the latter subject, does not speak of the former; but Ignatius, on the other hand, seems to regard them as identical. Generally, the feast of the A. preceded the celebration of the Lord’s supper. But during the period of the persecutions, when the Christians had often to hold divine service before dawn, the A. were, for the most part, delayed till the evening. Later, a formal separation was made between the two rites. In the 3d and 4th centuries, the A. had degenerated into a common banquet, where the deaths of relatives, and the anniversaries of the martyrs, were commemorated, and where the clergy and the poor were guests; but with the increase of wealth, and the decay of religious earnestness and purity in the Christian church, these A. became occasions of great riotousness and debauchery. Councils declared against them, forbade the clergy to take any share in their celebration, and finally banished them from the church. At the same time, it must be admitted that the heathens ignorantly calumniated the practices of the Christians in these A., and that the defenses made by Tertullian, Minucius, Felix, Origen, etc., are eminently successful. The Moravians have attempted to revive these A., and hold solemn festivals with prayer and praise, where tea is drunk, and wheaten bread, called love-bread, is used. See LOVE-FEASTS.

AGAPEMONE (Gr. love-abode), a conventual establishment of a singular kind, consisting of persons of both sexes, founded at Charlynch, near Bridgewater, in Somersetshire, by Mr. Henry James Prince, formerly a clergyman of the church of England. The inmates belong to a new religious sect originating with Mr. Prince, and a Mr. Starkey, also a clergyman, and are sometimes called Lampeter Brethren, from the place where Prince was educated, and where, while a student, he formed a revival society. The adherents of the sect generally, of whom there are many in the south-western counties, are known as Princeites or Starkeyites. The strange theories advocated by the founders of the sect, led to their dismissal from the church of England, but the heresy spread not only among the farmers along the coast of Sussex and Dorsetshire, but also among the educated classes. Community of goods being insisted upon, the leaders acquired considerable property, and fitted up in luxurious style a dwelling near Charlynch. Prince, who was styled “The Lord,” affirmed in his publications that he was sinless, and was sent to redeem the body, “to conclude the day of grace, and to introduce the day of judgment.” The Princeites, among other tenets, held religious objections to the increase of population, and claimed exemption from disease. See Hepworth Dixon, *Spiritual Wives* (1868), and *The Newbery House Magazine* (Nov. 1891).

It would appear that a society, similar in its aims and character, though not conventual in its form, existed in England in the 16th and 17th cs. It was called the “family of love.” Its founder is generally supposed to have been Henry Nicholas, a native of Münster, in Westphalia, but who lived a considerable time in Holland. He held himself to be greater than Moses or Christ, for the former only taught men to *hope*, and the latter to *believe*, while he first announced the doctrine of *love*. He made his appearance about 1540. Others, however, are of opinion that the real father of this “family” was one David George, a fanatical Anabaptist of Delft, in Holland, who died in 1556, and who imparted his “damnable errors” to Nicholas, an old friend of his. In the reign of Edward VI., according to Fuller, Nicholas came over to England, and commenced the perversion of silly people in a secret way. By 1572, they had apparently increased in numbers considerably, for in that year one John Rogers published a work against them, entitled, *The Displaying of an Horrible Secte of Grosse and Wicked Heretiques, naming themselves the Family of Love, with the Lives of their Authors, and what Doctrine they teach in Corners*. In 1580, queen Elizabeth issued a proclamation for the hunting out and punishing of the “damnable sect.” The family of love, “or lust, rather,” as old Fuller has it, tried to insinuate themselves into the good graces of king James, by presenting a petition, casting aspersions on the Puritans. At length, the society expired from continual exposure to the effects of ridicule in prose and verse, as well as from its own intrinsic worthlessness. Their doctrines seem to have been a species of pseudo-spiritual sentimentalism, resulting in gross impurity. (See MUCKERS.)

AGAPE TÆ, widows and virgins among the early Christians who devoted themselves to attendance upon ecclesiastics. Immorality followed, and the early councils denounced the practice.

AGAPE TUS, a deacon of St. Sophia’s church at Constantinople, who presented to Justinian, in 527, a work on the duties of a Christian prince. It is highly valued, and has been often reprinted.

AGARDE', ARTHUR, 1540-1615, an English antiquarian. He was bred to the law, and became deputy chamberlain, holding the office 45 years, in which time he became proficient in antiquarian knowledge. Camden and Sir Robert Cotton were his personal friends, and with them he was among the first members of the royal society of antiquarians.

A'GARDH, JAKOB GEORG, b. 1813; son of Karl Adolph, and followed the same study. He was professor of botany at Lund in 1854. He much increased his father's large collection, and wrote several botanical works.

A'GARDH, KARL ADOLPH, 1785-1859; a Swedish botanist. He was educated at Lund. In botany he paid special attention to cryptogamia, on which he is authority. In 1812 he was professor of botany and rural economy at Lund, and lectured on general economics. He became a priest in 1816; went into politics in 1817, and was elected to the diet; in 1834 was made bishop of Karlstadt, and was the leading liberal in the diet. A. was author of several books and papers, chiefly on botany, and a memoir of Linnæus.

AG'ARIC and **AGAR'ICUS**. See MUSHROOM.

AGA'SIAS, a Greek sculptor, supposed to have lived in the 4th c. B.C. The "Borghese Gladiator," one of his works, was found at Antium with the "Apollo Belvedere," and is now in the Louvre. It is a warrior on foot with head raised as if on guard against a horseman. Some suppose it represents Achilles, the invisible enemy being Penthesilea.

AG'ASSIZ, ALEXANDER, b. Switzerland, 1835, son of Louis, and joined his father in Boston in 1848. He graduated at Harvard in 1855, and was in the U. S. coast survey off California in 1859-60, studying the fauna of the Mexican coast. Subsequently he became largely interested in copper mining, and gave his attention successively to such scientific work as was involved in the positions of curator of the museum of comparative zoology, superintendent of the Anderson school of natural history, member of the scientific expedition to Chili and lake Titicaca, chief of the U. S. dredging expedition in the West Indies, and one of the overseers of Harvard college. He is a member of a great number of scientific societies, and has written largely upon ichthyology. He was appointed an officer of the Legion of Honor in 1896.

AG'ASSIZ, LOUIS JOHN RODOLPH, one of the most distinguished of modern naturalists, was born at Orbe, in the canton de Vaud, in 1807. After passing through the usual course of elementary learning at Biel and Lausanne, he prosecuted his studies at Zurich, Heidelberg, and Munich. In early youth he had displayed a strong love of natural history; and at Heidelberg and Munich comparative anatomy was his favorite occupation. In Munich he became acquainted with Martius and Spix, the well-known travelers in Brazil; and when Spix died (in 1826) his collection of 116 species of fish, collected in Brazil, was left in the care of A., who published it under the title *Pisces, etc., quos collegit et pingendos curavit Spix, descripsit A.* (Munich, 1829-31, with 91 illustrations in lithography.) Led by this work to study ichthyology more closely, A. next undertook a systematic arrangement of the fresh-water fishes found in central Europe. Of this work, the first fasciculus, containing the family of the Salmonideæ, appeared at Neuchâtel in 1839, with 34 illustrations, and descriptions in French, English, and German. A second fasciculus, prepared by his friend Vogt, *Embryologie des Salmones*, was published in 1840; and a third, *Anatomie des Salmones*, appeared in 1845 as a part of the third volume of the *Memoirs of the Neuchâtel Society of Natural History*. Beyond this, the work was not continued. A. at the same time devoted his attention to the fossil remains of fishes, and during his stay in Paris (1831-32), examined several private and public fossil collections. The results of his studies were given in his work *Recherches sur les Poissons Fossiles*, published at Neuchâtel, with 311 lithographed illustrations, (1833-42.) Meanwhile he had been invited to take the professorship of natural history at Neuchâtel; and here he found two active young friends, Desor and Vogt, who afforded considerable aid in the completion of his works. With their assistance his work on fossil fishes was brought to a conclusion in 1842. During several visits to England, A. made himself well acquainted with the collections of fossils in this country; and in 1844 published a monograph on fossil fishes found in the old red sandstone of the Devonian system. His study of these remains led him to examine other fossils; and the results appeared in his works *Description des Echinodermes Fossiles de la Suisse*, and *Monographies d'Echinodermes Vivants et Fossiles*. In the latter work, Professor Valentin, of Berne, supplied the section on the "Anatomy of the Sea-urchin." A. next turned his attention to the mollusca, and produced his *Critical Studies on Fossil Mollusca*, which was soon followed by his *Memoirs on the Muscles in Living and Fossil Mollusca*. His work on *Glaciers* excited great interest, as it opened new views in geology. The results of further study were given in a second work on *The System of Glaciers; or Researches on Glaciers* (Paris, 1847). In preparing this work, he was assisted by his friends Guyot and Desor. In 1846, A. went to the United States, where he was appointed to a professorship in Harvard college, near Boston; from which he was subsequently transferred (1852) to the chair of comparative anatomy in Charleston; but this he resigned (1854), and returned to Harvard. In *Outlines of Comparative Physiology*, A. upholds the doctrine of the successive creation of higher organized beings on the earth. *An Essay on Classification*, by A., was

published (Lond., 1859); and a *Journey in Brazil* (1868). During the latter of these years, he was appointed a non-resident professor and lecturer in Cornell university, Ithaca, N. Y.; and, along with count Portalés, was intrusted with the dredging operations in the investigation of the Gulf Stream, undertaken by the American government in 1871. A. granted that Darwinism (q. v.) could be theistically interpreted; but opposed it, chiefly on scientific grounds. D. in 1873. See Marcou', *Life, Letters and Works of Louis Agassiz* (1896).

AGASSIZ ASSOCIATION, a society formed about 1879 by Harlan H. Ballard, principal of Lenox (Mass.) academy, for the purpose of interesting his scholars in the study, collection, and preservation of natural objects. Since 1880 the association has become a general organization, including very many young people in various parts of the world, and not a few professional scientists and teachers, who recognize its value as an educational power. The parent chapter is that at Lenox. Branch chapters take their names from the towns where they are formed, and must consist of at least 4 persons. The payment of a small fee enables any one not connected with a chapter to become a corresponding member of the parent chapter, and to share in the advantages of the association, among which are free correspondence and exchange with naturalists, and free assistance from specialists in any department of science. The badge is a Swiss cross. Prizes for original research are offered by the association. At the first general convention, held at Philadelphia, Sept., 1884, 700 local branches and over 8000 members were reported. The membership afterwards increased to about 10,000, with 1000 chapters.

AG'ASSIZ, MOUNT, in Arizona, 70 m. n. e. of Prescott; an extinct volcano, 10,000 ft. above the sea-level. It is a favorite summer resort, and near it is the wonderful canyon of the Colorado. Another peak of this name in Utah is 13,000 feet high.

AG'ATE, a mineral composed of layers of quartz, generally of different varieties or colors, intimately joined together. The layers are often concentric, and in the section sometimes appear nearly circular or elliptical, sometimes angular. Chalcedony, amethyst, common quartz, jasper, flint, etc., occur as layers in A. It takes a fine polish, and is much used for ornamental purposes. It is common in amygdaloids. Many agates are found in Scotland, and are sold under the name of *Scotch pebbles*. See illus., **DIAMONDS**, ETC., vol. IV.

AG'ATHA, SAINT, a noble Sicilian lady of great beauty, who rejected the love of the proconsul Quintilianus, and suffered a cruel martyrdom in the persecution of Christians under Decius (251). She holds a high rank among the saints of the Roman Catholic church; her day falls Feb. 5.

AGATHAR'CHIDES, or AGATHARCHUS, a Greek grammarian and geographer, who lived about 130 B.C. He was guardian of an Egyptian king, probably Ptolemy Soter II. A. was an orator, and wrote several works, of which only one remains.

AGATHAR'CHUS, abt. 480 B.C.; a Greek painter; said to be the first who applied the laws of perspective. He painted a scene for a tragedy by Æschylus, and is called the first scene-painter.

AGATHIAS, surnamed ASIANUS; 536-580 A.D.; educated at Alexandria and Constantinople; studied Roman law and practiced with success; wrote love verses and made an anthology of earlier poets; but his most valuable work is a history of the years 553 to 558, in which he tells of the conquest of Italy by the Goths, of the earthquakes of 554 and 557, the beginning of the Greek and Persian war, the rebuilding of St. Sophia, the exploits of Belisarius, etc.

AGATH'OCLES, one of the boldest but most unworthy adventurers of antiquity, was b. at Thermæ, in Sicily, in 361 B.C. He rose from humble circumstances through the patronage of Damas, a noble citizen of Syracuse, and received a command in the expedition against Agrigentum. Afterwards he married the widow of Damas, and became one of the most wealthy men in Syracuse. Under the rule of Sosistratus, he was obliged to flee into lower Italy, where he collected a band of partisans. Returning to Syracuse, after the death of Sosistratus, he gained the supremacy, confirmed it by a massacre of several thousands of respectable citizens, and took possession of the greater part of Sicily. To establish his power, and keep his army employed, he now attempted to expel the Carthaginians from Sicily; but in this undertaking he was defeated. His next plan was to pass over to Africa with a part of his army and there attack the Carthaginians. This war he carried on with success for four years, or until 307 B.C., when disturbances in Sicily compelled him to leave the army for a time. On his return to Africa he found his troops in a state of mutiny against his son Archagathus, whom he had left in command, but pacified them by promises of large booty. Soon afterwards he suffered a serious defeat, and with deliberate treachery left his own son exposed to the vengeance of the disappointed soldiers. The son was put to death, and the troops surrendered themselves to the enemy, while A. escaped safely into Sicily, where, by fraud and cruelty, he soon recovered his former power, and was afterwards engaged in predatory inroads upon Italy. It was his intention to leave the throne to his youngest son, A.; but his grandson, Archagathus, made an insurrection, slew the royal heirs, and persuaded Mænon, one of the favorites of the aged tyrant, to destroy him by means of a poisoned toothpick. This took place in 289 B.C., when A. was 72 years old, and had reigned 28 years.

AG'ATHON, or **AGATHO**, 447-400 B.C.; a Greek tragic poet, contemporary and friend of Plato, Socrates, Alcibiades and Euripides; noted for personal beauty. After his first literary triumphs, in 416, a dinner was given to him, which Plato immortalized in his "Symposium," the scene being in A.'s house. He was sometimes ridiculed for bombast and for effeminate tastes, appearing on the stage in female dress.

AGAVÉ, a genus of plants belonging to the natural order *amaryllideæ* (q.v.), and having a tubular perianth with 6-partite limb, and a triangular, many-seeded inferior capsule. They are herbaceous plants, of remarkable and beautiful appearance. There are a number of species, all natives of the warmer parts of America. By unscientific persons they are often confounded with aloes (q.v.); and *A. Americana* is generally known by the name of **AMERICAN ALOE**. The agaves have either no proper stem, or a very short one, bearing at its summit a crowded head of large, fleshy leaves, which are spiny at the margin. From the midst of these shoots up the straight, upright scape, 24 to 36 ft. high, and at the base often 1 ft. in diameter, along which are small, appressed, lanceolate bractes, with a terminal panicle, often bearing as many as 4000 flowers. In S. America, these plants often flower in the 8th year, but in our hot-houses not until they have reached a very advanced age; whence arises the gardeners' fable of their flowering only once in 100 years. After flowering, the plant always dies down to the ground, but the root continuing to live, sends up new shoots. The best known species is *A. Americana*, which was first brought from S. America to Europe in 1561, and being easily propagated by suckers, is employed for fences in Italian Switzerland, and has become naturalized in Naples, Sicily, and the n. of Africa. By maceration of the leaves, which are 5 to 7 ft. long, are obtained coarse fibres, which are used in America, under the name of *magney*, for the manufacture of thread, twine, ropes, hammocks, etc. This fibre is also known as *pita flax*. It is now produced to some extent in the s. of Europe. It is not very strong nor durable, and if exposed to moisture it soon decays. The ancient Mexicans employed it for the preparation of a coarse kind of paper, and the Indians use it for oakum. The leaves, cut into slices, are used for feeding cattle.—Another species, *A. Mexicana*, is particularly described by Humboldt upon account of its utility. When the innermost leaves have been torn out, a juice continues to flow for a year or a year and a half, which, by inspissation, yields sugar; and which, when diluted with water, and subjected to 4 or 5 days' fermentation, becomes an agreeable but intoxicating drink, called *pulque*.

AG'DE, an ancient French t. in the dept. of Herault, founded by the Greeks, and situated about a league from the Mediterranean sea, on the left bank of a navigable stream. To the n., under the walls of the t., flows the Languedoc canal. The mouth of the stream forms a harbor, which admits vessels of 400 tons burden. The coast-trade of A., in particular, is very brisk, while it is also the entrepôt for the traffic of the s. and w. of France. It has, besides, considerable intercourse with Italy, Spain, and Africa. It carries on a large and prosperous trade in coal, wine, oil, grain, silk, etc., and manufactures soap and verdigris; but the general aspect of the place is sombre and forbidding, on account of the black basalt of which the houses are built, whence it has popularly received the name of the Black Town. It possesses a naval academy, and is noted in history as the place at which Alaric, king of the Goths, convened a council. Pop. '91, 7389.

AGE, in law, is that period of life at which persons are permitted legally to exercise certain rights which for lack of A. they had been restrained from. In general, a person is "of age" on the day preceding the 21st anniversary of birth. The "A. of discretion" is at 14 years for males and 12 for females, at which point either may marry or elect guardians. At full A. (21) male citizens can vote and hold office, except in certain specified cases, such as a representative in congress, who must be 25 years of age, a senator 30, and the president 35. The "military A.," confined to males, is from 18 to 45 years. In N. Y. no judge can hold office after he is 70 years of age; male citizens over 21 and under 60 are subject to jury duty. In mythology and poetic fancy, the course of the world was divided into 5 ages: the golden A., when Saturn reigned, was a period of innocence and happiness; the silver A., under the rule of Jupiter, was the voluptuous period; the brazen A., when Neptune held sway, was a warlike interval; the heroic A. under Mars was also warlike and adventurous; while the iron A., with Pluto as the ruler, was one of human degradation and misery. In chronology we have many ages, the principal being the antediluvian and the postdiluvian. In anthropology there is the A. of stone, the A. of bronze, and the A. of iron, indicated by the use of these substances for tools in successive periods. In geology there are the azoic, the silurian, the Devonian, the carboniferous, the reptilian, the mammalian; and the A. of man, or the present A. In letters there are the A. of Pericles in Greece, the Augustan A. in Rome, the Elizabethan A. in England, and the Augustan A. in France under Louis XIV. There is the heathen as opposed to the Christian A.; the A. of the crusades; the dark A.'s, the middle A.'s and the A. of steam. The progress of mental activity has been divided into the A. of the supernatural, the A. of the metaphysical, and the A. of the positive. Physiologically human life is divided into infancy, youth, manhood, and old A. See **CONSENT**; **INFANT**.

AG'ELNOTH, or **ETHELNOTH**, known also as **ACHELNOTUS**; son of Egelmaer, archbishop of Canterbury in the reign of Canute. A. exercised great and salutary influence over that headstrong monarch, both to prompt and to restrain, counseling the policy that finally united the Danes and Saxons to oppose the Normans. He also made peace in the church and ended the persecution raging between the Benedictines and the secular clergy. He was made archbishop, and went to Rome in 1022 to receive the pall. On

his return he purchased at Pavia a relic, said to be the right arm of St Augustine of Hippo. When Canute died he made A. promise to be faithful to his sons by Emma, and the promise was so well kept that Harold the usurper remained unconsecrated until after the death of A.

AGEN', the chief t. of the department of Lot-et-Garonne in France, is situated in a fertile region on the right bank of the Garonne. The town is old and gloomy in appearance; but carries on an active trade in woolen and linen fabrics, leather, colored paper, colors, cordage and sail-cloth. It forms the connecting-link of the intercourse between Toulouse and Bordeaux, and exports plums, brandy, hemp, flax and poultry. Close by it is the old-fashioned house in which Joseph Scaliger, the prince of scholiasts, was born. In ancient times A. was the scene of many a fierce martyrdom of the Christians, when it was under the rule of Roman prætors. Afterwards it suffered the miseries of war, during the barbaric irruptions from Germany, to a most incredible extent, having been taken and plundered by Goths, Vandals, and Huns, in their turn. It was seized by the English, in their early French wars, and, at a later period, was twice taken by the Huguenots, in the religious contests of the 16th c. It has many interesting antiquities. Pop. '91, 20,400.

AGENDA (Lat., *things to be done*), a term applied by theologians to practical duties as distinguished from the *credenda*, *things to be believed*, or doctrines that must be accepted as articles of faith. Among writers of the ancient church, the term signified both divine service in general and the mass in particular. We meet with *agenda matutina* and *vespertina*, morning and evening prayers; *agenda diei*, the office of the day; *agenda mortuorum*, the service of the dead. It is also applied to church-books, compiled by public authority, prescribing the order to be observed by the ministers and people in the ceremonies and observances of the church. In this sense *agenda* occurs for the first time in a work of Johannes de Janua about 1287. The name was especially used to designate a book containing the formulæ of prayer and ceremonies to be observed by the priests in their several ecclesiastical functions. It was generally adopted by the Lutheran Church of Germany, in which it is still in use, while in the Roman Church it has been, since the sixteenth century, supplanted by the term *ritual* (q.v.).

AGENOIR, a fabulous king of Phœnicia, son of Neptune, twin brother of Belus; father of Cadmus, and some say of Europa. When Europa was carried off by Zeus, A. sent his sons to find her, with orders not to return until they had done so. She was not found, and the sons settled in various countries. Buttmann supposes A. to be the Canaan of Moses (Gen. x. 6).

AGE OF REASON. A name given to a certain period of the French revolution, when Christianity was decried and Reason acknowledged as the only true Goddess. This movement was carried on by Hebert and his followers, professed atheists, who succeeded in persuading many Christians to renounce their faith. The worship of Reason centres round the ceremonies held in her honor at Notre Dame, November 10, 1793. The Goddess, typified by a painted harlot, was placed on the altar and received the homage of her worshippers. A schism in the party of the Montagnards, to which the atheists belonged, led to their execution, which occurred March 24, 1794.

AGENT (Latin, *agens*). One who is employed to act for another in some matter connected with the making of contracts. An agent is distinguished from a servant, in that the latter is employed merely to do work or services for a master, and is not generally authorized to make contracts, by which his employer shall be bound. One who is employed to render specified services for another, and is also authorized to enter into contracts with third parties in connection therewith, is both an agent and a servant. An agency may be either, (1) general or (2) special. (1) A general agent is one who is employed by his principal to manage and attend to all the affairs of a certain business or department thereof. One who holds himself out to the community as ready and willing to transact all the business of a specified kind for any one who may employ him, such as a commission merchant or insurance broker, is a general agent for the time being for those who employ him in that capacity. A general agent binds his principal by all his acts done within the scope of his business or employment. (2) A special agent is one employed to do some specific work for his principal, as such agent, and who is not given the general management of any branch of business. He can bind his principal only by acts done strictly within the scope of the authority given by the latter. If the principal either employ his agent as a general one, or by his acts or representations lead those who deal with such agent to believe that he is so employed and to act upon that belief, he will be bound by all the acts of the agent as such, whether he be in fact a general or a special agent. One who knowingly deals with a special agent cannot hold the principal liable for the acts of such agent outside of the strict authority given him by such principal. See also, **FACTOR**, **BROKER**, **COMMISSION MERCHANT**.

AGES, a term employed to designate the epochs of civilization in the history of the human race. The old poets and philosophers described these in harmony with what they conceived to have been the moral and political condition of their ancestors. The idea of a succession of A. presented itself at a very early period to the Greek mind. The life of the race was likened to that of the individual—hence the infancy of the former might easily be imagined to be, like that of the latter, the most beautiful and serene of all. Hesiod mentions 5 A.—the golden, simple and patriarchal; the silver, voluptuous and goddess; the brazen, warlike, wild and violent; the heroic, an aspiration towards the

better; the iron, in which justice, piety and faithfulness had vanished from the earth, the time in which Hesiod fancied that he himself lived. Ovid closely imitates the old Greek except in one particular—he omits the heroic age. This idea, at first perhaps a mere poetic comparison, gradually worked its way into prose, and finally became a portion of scientific philosophy. These A. were regarded as the divisions of the great world-year, which would be completed when the stars and planets had performed a revolution round the heavens, after which destiny would repeat itself in the same series of events. Thus mythology was brought into connection with astronomy. The golden A. was said to be governed by Saturn; the silver, by Jupiter; the brazen, by Neptune; and the iron, by Pluto. Many curious calculations were entered into by ancient writers to ascertain the length of the heavenly year, and its various divisions. The greatest discrepancy prevailed, as might naturally be expected: some maintaining that it was 3000, and others as many as 18,000 solar years. The Sybilline books compared it to the seasons of the solar year, calling the golden age the spring, etc.; and on the completion of the cycle, the old order was renewed. The idea of a succession of A. is so natural, that it has inwrought itself into the religious convictions of almost all nations. It is sanctioned by scripture, for it is symbolically adopted in the Apocalypse to a certain extent; it also manifests itself in the sacred books of the Indians. Modern philosophy, at least in Germany and France, has also attempted to divide human history into definite A. or periods. Fichte numbers five, of which he conceives that we are in the third; Hegel and August Comte reckon three, placing us in the last.

AGESILAUS, king of Sparta (399–360 B.C.), was elevated to the throne chiefly by the exertions of Lysander. Being called upon by the Ionians to assist them against Artaxerxes, he commenced a splendid campaign in Asia; but was compelled by the Corinthian war, in which several of the Grecian states were allied against Sparta, to leave his conquest over the Persians incomplete, and return to Greece. At Chæronea (394 B.C.), he gained a victory over the allied forces, and in 378 the war was concluded by a treaty of peace in favor of Sparta. Afterwards, in the Theban war, though hard pressed by Pelopidas and Epaminondas, he bravely and ably defended his country. He died in his 84th year. A. is described as of small stature but commanding aspect, blameless in his private character, and, in public life, just, as far as his partiality for his own country allowed. His biographers are Xenophon, Plutarch, and Cornelius Nepos.

AGGERHUUS, or **AKERSHUUS**, a department in s. e. Norway, 2012 sq. m., pop. '91, about 100,000. The chief business is in iron, lumber, pitch, tallow, and hides. The district has many small lakes, and the scenery is beautiful.

AGGLUTINATE LANGUAGES, the name given to the Turanian tongues, because the pronouns are attached (glued on) to the verbs, and prepositions denoting case in the same way attached to substantives. See **PHILOLOGY**; **TURANIAN LANGUAGES**.

AGGREGATION, STATES OF; the three states, solid, liquid and gaseous, in which matter occurs, depending upon the degree of cohesion that exists between the molecules or atoms of material bodies. In a solid state the molecules are fixed, and cannot be changed from their position without force; in the liquid state they move freely on each other, and the cohesion is so slight that the body has no fixed form; in the gaseous state they are affected by an elastic force that amounts to repulsion, tending to disperse them through increased space. A recent hypothesis, to which some facts seem to point, is that of a fourth state, called "radiant," in which matter is supposed to exist at a point as far beyond the gaseous as that is beyond the liquid.

AGINCOURT. See **AZINCOURT**.

AGIO, an Italian word, signifying "accommodation," was first used in Italy to denote the premium taken by money-changers in giving gold for silver, on account of the greater convenience of gold for transport. The same word is now used to denote the difference between the real and the nominal value of money; also the variations from fixed pars or rates of exchange. It corresponds very nearly to the English word "premium."

AGIS, the name of several kings of Sparta. Mention is made of a king A. as early as about 1000 years B.C., who subdued the old inhabitants of Sparta, and made the Helots vassals or slaves. Of the others, A. I. reigned during the greater part of the Peloponnesian war, from 420 to 397 B.C.—A. II. ascended the throne in 338 B.C. His hatred of the Macedonian supremacy led him to form alliances with several Persian satraps against Alexander the great. A., after extending his conquests to almost all the cities of Peloponnesus, fell in battle 330 B.C.—A. III. came to the throne in 244 B.C., when the state of Sparta had fallen into a ruinous condition through long-continued war. Though only twenty years old when he began to reign, he boldly resolved to restore the old institutions and severe manners of Sparta; but intrigues and self-interest in the higher classes frustrated his designs. The riches of the state were now in the hands of a few persons, while a great majority of the people were in extreme indigence. A., therefore, in accordance with the old laws of the state, proposed a redistribution of landed estates by lottery. The new ephorus, Agesilaus, who was rich in landed property, but burdened with many debts, astutely proposed that first all debts should be canceled, and next the lands should be divided. The first part of this plan was soon effected; but great hindrances were opposed to the carrying out of the remainder. Meanwhile, the disappointed people were easily persuaded that A. had endeavored to introduce measures inimical to the wel-

fare of the state. Pursued by his enemies, he fled for refuge to a temple, but was betrayed by false friends into the hands of the magistrates, who immediately ordered him to be put to death by strangulation (240 B.C.). His mother and his grandmother, who had favored his measures, were barbarously executed in the same manner. Alfieri, the Italian poet, wrote a powerful tragedy on the fate of A. III.

AGLA'OPHON, a Greek painter, who lived about 500 B.C.; father of Polygnotus and Aristophon, also painters and his pupils. Quintilian praises A.'s pictures for simplicity of coloring. Another artist of the name, supposed to be a grandson, painted a portrait of Alcibiades.

AGME'GUE, or **GAGMEGUE**, a name of the Mohawk Indians. They called themselves by a word signifying "she-bear." The Algonquins called them Mahaquas, which the French made Moquis, Mohawks, or Mohocks. They were usually at war with the French of Canada; but the Dutch kept them friendly, making a treaty in 1618 that lasted until the old French war, when they did good service for the English in Canada. In the revolution they sided with the British, and under the famous chief Thayendenega, or Brant, did much damage to frontier settlements. Soon after the peace they migrated from their old home in central N. Y. to Canada, where a small remnant still exists. Their language has been elucidated in grammars by Bruyes and Marcoux; and Brant translated the prayer-book and parts of the bible into their tongue.

AGNA'NO, formerly a small lake near Naples, with no visible outlet. It has been drained, because it was thought to cause malaria. The lake was originally named *Anguiano*, from the number of snakes in the neighborhood. On the right of lake A. lies the *grotto del cane*—so called from the stratum of carbonic acid gas, some 18 inches deep, which always covers the floor, and which suffocates a dog (*cane*) or other small animal taken into it—and on the left are found the natural vapor-baths of *San Germano*, used for the cure of gout, rheumatism, etc., but inferior in virtue to the baths (*stufie di Nerone*) at Baiæ. The volcanoes surrounding the lake have been extinct since 1198 A.D. Further on the left from A. lies the lake of *Astroni*, which occupies the crater of an extinct volcano, and is surrounded by beautiful woodlands.

AGNATE (Lat. *agnatus*). Agnates, in the law both of England and Scotland, are persons related through the father, as cognates are persons related through the mother. In the Roman law, both of these terms had a somewhat different signification. Agnates, by that system, were persons related through males only, whilst cognates were all those in whose connection, though on the father's side, one or more female links intervened. Thus, a brother's son was his uncle's A., because the propinquity was wholly by males; a sister's son was his cognate, because a female was interposed in that relationship. With us the intervention of females is immaterial, provided the connection be on the male, or paternal side of the house. The reason for having thus changed the meaning of terms manifestly borrowed from the Roman law, seems to be that in Rome the distinction between agnates and cognates was founded on an institution which has not been adopted in the Roman sense by any modern nation—that, namely, of the *patria potestas* (q.v.). Roman agnati are defined by Hugo to be all those who either were actually under the same *paterfamilias*, or would have been so had he been alive; and thus it was that, as no one could belong to two different families at the same time, the agnation to the original family was destroyed, and a new agnation created, not only by marriage, but by adoption (q.v.). The foundation of cognation, again, was a legal marriage. All who could trace up their origin to the same marriage were *cognati*; and thus the term *cognatus*, generally speaking, comprehended *agnatus*. But though an agnatus was thus almost always a cognatus, a cognatus was an agnatus only when his relationship by blood was traceable through males. Justinian abolished entirely the distinction between agnates and cognates, and admitted both to legal succession and to the office of tutor of law, not only kinsmen by the father, though a female had been interposed, but even those by the mother (*Nov. 118, c. 4, 5*). As to the legal effects of the distinction in the modern sense, see **SUCCESSION**, **GUARDIAN**.

AGNES, SAINT, a Christian virgin, martyred by order of Diocletian, when about 15 years old. The legend is that her beauty excited the son of a prætor, whom she escaped through miraculous blindness that fell upon him; and that his sight was restored in answer to her prayers.

AGNESI, MARIA GÆTANA, 1718–99, a woman remarkable for her varied attainments, was b. at Milan. In her ninth year she could converse in Latin, and gave a lecture in this language, in which she argued that a knowledge of the ancient languages was a proper accomplishment in women. In her eleventh year she could also speak Greek fluently, and subsequently acquired with great facility several of the oriental languages, and also French, Spanish and German. She was jocosely styled "the walking polyglot." This precocious development of intellect was encouraged by her father, who invited parties of learned men to his house, with whom Maria disputed on philosophical points. Of her discourses in these parties, her father published some specimens entitled *Propositiones Philosophicæ* (Milan, 1738). After her twentieth year she devoted her mind to the study of mathematics, wrote an unpublished treatise on *Conic Sections*, and published her *Istituzioni Analitiche* (2 vols., Milan, 1748). This work so extended her reputation

that when her father was disabled by infirmity she took his place as professor of mathematics in the university of Bologna, by the appointment of pope Benedict XIV. It is said that after her devotion to the study of mathematics her cheerfulness vanished, she avoided society, and at last became a nun, and gave the whole of her time to attendance on the poor and the afflicted. Maria A. was a remarkable exception to the general rule of precocious intellect and short life, as she lived to the age of 81.

AGNES SOREL, 1409-50; mistress of Charles VII. of France, and lady of honor to the queen, the virtuous Marie of Anjou, whose full confidence she long enjoyed. She had great influence over Charles, and is credited with rousing him from the lethargy into which he had fallen after the successes of Henry V. of England at Agincourt and elsewhere. Her death was sudden, and it is supposed that she was poisoned by the dauphin, afterwards Louis XI. She had three children by the king.

AGNEW, CORNELIUS REA, 1830-88, physician, author of valuable monographs on diseases of the eye and ear. He founded the Brooklyn Eye and Ear Hospital in 1868, became one of the trustees of Columbia College in 1874, and was a professor in the College of Physicians and Surgeons, New York.

AGNEW, DANIEL HAYES, M.D., 1818-92, professor of surgery at the university of Penn., and very widely known by his surgical inventions and by his works.

AGNI, or **AGNIS**, the Hindoo god of fire, represented with two faces, three legs, and seven arms. He is of deep red color, and the faces are said to represent fire in its two elements: beneficent and destructive; the seven arms represent the primary colors. He bears incense to heaven, and appears to be a mediator between men and the gods.

AGNOËTÆ, a sect in the 6th c. which gave prominence to the statement that, in his human nature, Christ was ignorant of many things, especially of the time of the day of judgment. An earlier sect of the same name denied the omniscience of God.

AGNOLO, BACCIO D', about 1461-1543, b. Florence; architect of the villa Borgherini, and of the campanile of the church of San Spirito, in that city. He was the first to use frontons, or frontispieces, for windows and doors in private buildings.

AGNOMEN, among the Romans, a fourth name derived from some act, quality or event, as "Cunctator" added to Fabius, equivalent to "Fabius the delayer." Pliny "the younger" is also an instance.

AGNONE, a t. of S. Italy, in the province of Campobasso, and 22 m. n. w. from the t. of Campobasso. It stands on a hill, and is said to occupy the site of the ancient *Aquilonia*. It is celebrated for its copper works. Pop. about 10,000.

AGNOSTICISM, a word compounded from two Greek words signifying *lack* and *knowing*, to express the doctrine taught of late, especially by Herbert Spencer, Huxley, and others—but clearly traceable in much of the ancient Greek philosophy, and frequently reappearing in speculative thought—that man from his very nature is incapable of forming trustworthy conclusions concerning the being of a God or his own relations to the infinite. His mental limitations, it is asserted, preclude him from any knowledge of the absolute, the unconditioned; he can see things only as they appear to him, and not as they are—phenomena, not noumena. Knowledge is derived exclusively through the senses, and is simply the accumulated experience of the race; hence everything which lies outside of the sphere of sense lies also outside of the grasp of the mental faculties. No philosophical basis of certainty is attainable on any subject which transcends the limits of human experience. In theology this school of thought seeks a middle ground between the dogmatic theist and the dogmatic atheist, claiming to avoid affirming with the one or denying with the other, and to be opposed equally to both. It teaches that the true philosophy is to find out what are the limitations of the human mind, and then to confine the activity of the mental faculties within the regions of the "knowable," shunning as useless all speculations concerning the "unknowable." Reasoners against this doctrine have pointed out that its difference from atheism is apparent rather than substantial; and that if it give its principles their full development it cuts away its own foundation; and, further, that, as presented by its advocates, it manifestly claims to know and to assert various things regarding its own "unknowable." Its latest utterances show signs of modification at the hands of its cultured adherents.

AGNUS DEI (Lat., "Lamb of God"), one of the titles of Christ (John i. 29); also the name given to a certain prayer used in the Roman Catholic service of mass. The litanies generally conclude with the same prayer: "O Lamb of God, that takest away the sins of the world, have mercy upon us."—The figure of a lamb bearing a cross, stamped upon an oval of wax, silver, or gold, is also styled an *A.D.* Such medals have been consecrated by the popes since the 14th c., and are generally distributed among the faithful on the first Sunday after Easter. In the ancient church candidates for baptism received similar medals of wax and wore them as amulets. See **AMULET**. In the Greek church, the cloth which covers the cup in the communion service bears the image of a lamb, and is styled the *A.D.*

AGONIC LINE, the line of no variation of the magnetic needle. It passes from pole to pole in a curve differing widely from the meridian, as the acclinic line (line of no inclination or dip of the needle) differs from the equator. The *A. L.* varies in position, constantly traveling westward in unison with the magnetic pole, at a rate that might

make a revolution around the earth in about 600 years. In 1580, the line ran through Sweden; in 1620, through Holland; in 1660, England; in 1700, the w. part of Ireland; it reached America in 1780, and now crosses the w. part of Ohio.

AGONISTICI, an ascetic sect of Christians in Africa in the 4th c., who believed in neither labor nor marriage. They were mostly low and ignorant, living by beggary, and courting violent death as martyrdom. They disappeared after an invasion of the Vandals.

AGONY COLUMN, in England, a term applied to that part of a newspaper, generally the second column of the advertisement sheet, headed by notices of losses and disappearances, mysterious communications and correspondence.

AGOSTA, or **AUGUSTA**, a fortified city of Sicily, in the province of Syracuse, 12 m. n. of that city. It stands on a peninsula projecting into the Mediterranean. It is said to occupy the site of the *Megara Hyblaea* of the ancients, but contains no ancient remains. The present city was founded by the emperor Frederick II. in 1229. It was the last place in Sicily to hold out against Charles of Anjou, but was betrayed into the hands of William L'Estendard, one of his barons, in 1268, when it was sacked, and its inhabitants mercilessly butchered. It remained desolate for years, but having been repopled, and begun again to prosper, it was burned and razed to the ground in 1360 in another Sicilian war; and again was taken and burned by the Turks in 1551. Finally, in 1693, it was destroyed by an earthquake, when one-third of the inhabitants perished. Near A. was fought, in 1676, a great naval battle between the French and the Dutch, in which Admiral De Ruyter was killed. The port is spacious, but of rather difficult access. Salt is the chief article of export. Oil, wine, cheese, fruit, honey, and sardines are also exported. Pop. about 13,000.

AGOUTI, **MARIE CATHERINE SOPHIE DE FLAVIGNY**, Countess, 1805-76; a French authoress known by her signature of "Daniel Stern," daughter of vicomte De Flavigny. She was married in 1827; traveled in central Europe; wrote novels, 1841 to 1845, *Herve*, etc., which appeared in *La Presse* of Paris. In 1848, she became a political writer, and published a history of the revolution of that year, in which she favored the cause of the people. She wrote, also, *Three Days in the Life of Mary Stuart*, *Dante and Goethe*, etc. She had a daughter by Franz Liszt, who justified her musical paternity by marrying first Hans Von Bulow, and next Richard Wagner.

AGOUTI (*Dasyprocta agouti*), a small quadruped nearly allied to the cavy or Guinea-pig, very abundant in some parts of the W. Indies and of S. America. It is often very injurious to the fields of sugar-cane. It is gregarious. Its flesh resembles that of the hare or rabbit. Other species are found in the same regions, and even in the colder parts of S. America. The *pampas hare* is *dasyprocta patachonica*. See illus., **ANTELOPES**, ETC., vol. I.

A'GRA, a British district in the lieutenant-governorship of the North-western Provinces, bounded n. and e. by the districts of Muttra, Minpooree and Etawah, s. and w. by the territories of Dhertpore, Gwalior and Bhurtpore. Its area is 1845 sq. m. The surface of the country is for the most part very level, the principal elevation of the Futtehpore Sikri hills, a sandstone range on the w. frontier, being about 700 ft. The principal rivers are the Jumna—flowing along the n.e. frontier, and its tributary the Chumbul (along the southern boundary), both of which are too deep in the channel to be of much avail for irrigation. The district generally is, in consequence, deficient in water, and the failure of the rains in some seasons (as in 1837, 1838) has been followed by severe famine. Pop. '91, about 1,000,000; of the division of the same name, 4,767,720.

AGRA, a city in the British n. w. provinces in India, is situated in the district of the same name on the right bank of the Jumna, 110 m. s. e. from Delhi, and 841 n. w. from Calcutta. The ancient walls of the city embrace an area of about 11 sq. m., of which about one half is at present occupied. The houses are for the most part built of the red sandstone of the neighboring hills. The principal street, running n. w. from the fort, is very spacious, but the rest are generally narrow and irregular, though clean. Some of the public buildings, monuments of the house of Timour, are on a scale of striking magnificence. Among these are the fortress built by Akbar, within the walls of which are the palace and audience-hall of Shah Jehan, and the Moti Masjid or Pearl Mosque, so called for its surpassing architectural beauty. Still more celebrated is the Taj Mahal, situated without the city, about a mile to the e. of the fort. This extraordinary and beautiful mausoleum was built by the emperor Shah Jehan for himself and his favorite wife, Arjmand Banoo (surnamed Mumtaz Mahal). 20,000 men, says Tavernier, who saw the work in progress, were employed incessantly on it for 22 years. The principal parts of the building are constructed or overlaid outside and in with white marble; and the mosaic work of the sepulchral apartment and dome is described by various travelers in terms of glowing admiration. It is composed of twelve kinds of stones, of which lapis-lazuli is the most frequent, as well as the most valuable. Of British edifices in and near the city, the principal are the government house, the college (for the education of natives), the Metcalfe testimonial, the English church and the barracks. The climate at A., during the hot and rainy seasons (April to September), is very injurious to Europeans; but on the whole, the average health of the city is equal to that of any other station in the n. w. provinces. A. is fortified and has a garrison; there is a military station in the neighborhood of the city. As administrative center of its district, and of the large "division" to which it gives name, A. is a place of great importance. The pop.,

according to the census of 1891, is 168,662. The principal articles of trade are cotton, tobacco, salt, sugar, and grain. It is a very important railway centre. This city is held in great veneration by the Hindoos, as the scene of the incarnation of Vishnu under the name of Parasu Rama. It first rose to importance in the beginning of the 16th c., and from 1526 to 1658 it was the capital of the Mogul sovereigns. In that year, Aurungzebe removed to Delhi; henceforth A. declined. It was taken in 1784 by Scindia, and surrendered in 1803 to Lord Lake, after a bombardment of a few hours. Among the spoils on that occasion was a cannon of 23 in. calibre, 11½ in. metal at the muzzle; length, 14 ft. 2 in.; weight, 96,000 lbs. The balls, of cast-iron, weighed 1500 lbs. This stupendous piece of ordnance is said to have been wantonly reduced to fragments by blasting by some artillery officers in 1833 (*Thornton's Gazetteer of India*). During the Sepoy mutiny, A. was one of the places in which the Europeans were shut up. At the outbreak the garrison consisted of the 44th and 67th regiments of B. N. infantry, the 3d European fusiliers and a few artillery. The native regiments were disarmed in June, 1857, and the defense of this important city devolved upon the Europeans. The ladies resorted at night to places of refuge appointed by the governor, while the gentlemen patrolled the streets; but matters growing worse both in the city and country, it was resolved, after a battle with the mutineers, to abandon the city and retire to the fort or residency. It was time; for some thousands of prisoners getting loose, began to fire all the European buildings in the city. Hardly a house escaped destruction; numbers of traders were ruined, and had to endure the misery of beholding their ruin from the fort. As the fort was both large and strongly defended, fugitives flocked in from all parts of the country, and the numbers soon swelled to 5846. Heroic sallies were occasionally made. Major Montgomery's march to Allypurg, and his defeat of the rebels, though twenty times as numerous, was a feat worthy of Havelock. When Delhi fell, its rabble of defenders hurried off in the direction of A., which place was seriously threatened by them, but was relieved by the rapid and brilliant march of Col. Greathed.

AGRAM, the capital of Croatia, finely situated at the foot of a richly wooded range of mountains, is about 2 m. from the Save, in lat. 45° 49' n., long. 16° 4' e. King Bela IV. raised it in 1266 to the dignity of the royal town, in consequence of its having assisted him against the Tartars. It is the seat of a cathedral and of a university founded in 1874. Pop. '90, about 37,000.

AGRAPHIA (literally, "unwritten"), the extra-canonical sayings of Christ; such words and expressions as are not found in the *Græphe* or body of accepted writings of the Church, but which were current either as oral traditions or as literature which has been lost. That a vast number existed outside of the present gospels is plainly inferred from John xxi. 25; and those found in the works of the early Fathers are introduced and employed as though they were derived from sacred records. Some specialists in Hebrew literature assert that even the Talmud contains sayings of Christ which, having become current among the Jews, were introduced without knowledge of their source. A work entitled *Agrapha* (Leipzig, 1890), compiled by Rev. Alfred Resch, gives 139 of these sayings, seventy-five of which the author regards as genuine and attributes to a Hebrew lost gospel.

AGRIAN LAW. With the name of A. L. used to be associated the idea of the abolition of property in land, or at least of a new distribution of it. This notion of the A. laws of the Romans was not only the popular one, but was also received by most scholars. The French convention, in 1793, passed a law punishing with death any one who should propose an A. L., understanding by the term an equal division of the soil among all citizens. Now, it would have been strange if the Romans, with whom private property was so sacred, could ever have been brought to sanction any measure of the kind. It was the German scholars, Heyne, Savigny, and especially Niebuhr, who first explained the true nature and character of the Roman A. laws. There are still some disputed points on this matter, but one thing seems made out—that those laws had no reference to private lands held in absolute property, but to public or state lands.

As the dominion of Rome extended, a portion more or less of each conquered territory was confiscated to the state, and became public domain. All laws respecting the disposition of these lands were called A. laws; which are therefore of various kinds. What made these laws be so long mistaken for an interference with private rights, and excited such opposition to them at the time, was the use which was made of the public domains while unappropriated. "It was the practice at Rome," says Dr. Arnold, "and doubtless in other states of Italy, to allow individuals to occupy such lands, and to enjoy all the benefits of them, on condition of paying to the state the tithe of the produce, as an acknowledgment that the state was the proprietor of the land, and the individual merely the occupier. Now, although the land was undoubtedly the property of the state, and although the occupiers of it were in relation to the state mere tenants-at-will, yet it is in human nature that a long undisturbed possession should give a feeling of ownership; the more so as, while the state's claim lay dormant, the possessor was, in fact, proprietor, and the land would thus be repeatedly passing by regular sale from one occupier to another."

The state, however, was often obliged to interfere with these occupiers of the public lands, and resume its rights. The very idea of a citizen, in ancient times, involved that of a landholder, and when new citizens were to be admitted, they had each to receive their portion out of the unallotted public domain; which was attended, of course, with the ejection of the tenants-at-will. It appears, also, that the right to enjoy the public

lands in this temporary way was confined to the old burghers or patricians. This, taken in conjunction with the tendency, strong at all times, of larger possessions to swallow up smaller, kept up an ever-increasing number of landless commons, whose destitution and degradation came from time to time to such a pitch that alleviation was necessary to prevent the very dissolution of the state. It is easy, however, to see what motive the patricians, as a body, had to oppose all such measures, since it was their interest, though not their right, to keep the lands unallotted.

The enactment of A. laws occasioned some of the most memorable struggles in the internal history of Rome. Most of the kings of Rome are said to have carried an A. L., that is, to have divided a portion of the public land among those whom they admitted to the rights of citizenship. "The good king," Servius Tullius, may be looked upon as the first victim of the hostility of the nobles to A. laws. About twenty-four years after the expulsion of the Tarquins, the distress of the commons called aloud for remedy, and the consul, Spurius Cassius, proposed an A. L. for a division of a certain proportion of the public land, and for enforcing the regular payment of the rent or tithe from the occupiers of the remainder. The aristocracy, however, contrived to defeat the proposal, and when the year of his consulship was out, Cassius was accused of trying to make himself king, was condemned, scourged and beheaded, and his house razed to the ground.

The first important A. L. of a permanent nature, actually passed, was that proposed by the tribune, Licinius Stolo, and carried, after a struggle of five years, in the year of Rome 383. The provisions of Licinius's bill, or *rogation*, were as follows: "Every Roman citizen shall be entitled to occupy any portion of the unallotted state land not exceeding 500 *jugera* (see ACRE), and to feed on the public pasture-land any number of cattle not exceeding 100 head of large, or 500 head of small, paying in both cases the usual rates to the public treasury. Whatever portions of the public land beyond 500 *jugera* are at present occupied by individuals shall be taken from them, and distributed among the poorer citizens as absolute property, at the rate of seven *jugera* apiece. Occupiers of public land shall also be bound to employ a certain number of freemen as laborers."

This law produced for a time very salutary effects. But before the year 621, when Tiberius Gracchus was elected tribune, the Licinian law had been suffered to fall into abeyance; and although vast tracts had been acquired by the Italian, the Punic and the Greek wars, no regular distribution of land among the destitute citizens had taken place for upwards of a century. Numerous military colonies had indeed been founded in the conquered districts, and in this way many of the poorer Romans or their allies had been provided for; but still there remained large territories, the property of the state, which, instead of being divided among the poorer members of the state, were entered upon and brought into cultivation by the rich capitalists, many of whom thus came to hold thousands of *jugera*, instead of the five hundred allowed by the Licinian law. To a Roman statesman, therefore, looking on the one hand to the wretched pauper population of the meaner streets of Rome, and on the other to the enormous tracts of the public land throughout Italy which the wealthy citizens held in addition to their own private property, the question which would naturally present itself was—Why should not the state, as landlord, resume from these wealthy capitalists, who are her tenants, as much of the public land as may be necessary to provide little farms for these pauper citizens, and so convert them into respectable and independent agriculturists? This question must have presented itself to many; but there were immense difficulties in the way. Not only had long possession of the state lands, and the expenditure of large sums in bringing them into cultivation, given the wealthy tenants a sort of proprietary claim upon them, but in the course of generations, during which estates had been bought, sold and inherited, the state lands had become so confused with private property that in many cases it was impossible to distinguish between the two. Notwithstanding these difficulties, Tiberius Gracchus had the boldness to propose an A. L., to the effect that every father of a family might occupy 500 *jugera* of the state land for himself, and 250 *jugera* additional for each of his sons; but that, in every case where this amount was exceeded, the state should resume the surplus, paying the tenant a price for the buildings, etc., which he had been at the expense of erecting on the lands thus lost to him. The recovered lands were then to be distributed among the poor citizens; a clause being inserted in the bill to prevent these citizens from selling the lands thus allotted to them, as many of them would have been apt to do.

According to the laws and constitution of Rome, there was nothing essentially unjust in this proposal, which was, in private, at least, approved of by some of the most distinguished men of the time. The energy of Gracchus carried the measure, in spite of the opposition of the aristocratic party, whose vengeance, however, could only be satisfied with the assassination of Gracchus and his brother. See GRACCHUS. The attempts to carry out the "Sempronian law," as it was called, were attended with great difficulties, and although not formally repealed, it continued to be evaded and rendered inoperative. Various A. laws were subsequently passed, some by the victorious aristocratic party, in a spirit directly opposed to the Licinian and Sempronian laws.

Besides A. laws having for their object the division among the commons of public lands usurped by the nobles, there were others of a more partial and local nature, for the establishment of colonies in particular conquered districts: these naturally met with

less opposition. Still more different were those violent appropriations of territory made by the victorious military leaders in the latter times of the republic, in order to reward their soldiers, and established exclusively military colonies. In these the private rights of the previous occupants were often disregarded. See IRISH LAND LAWS.

AGREDA, MARIA DE (CORONEL), 1602-65; the superior of the convent of the Immaculate Conception in Agreda, Spain. She reported that she had had revelations from heaven, and that God had commanded her to write an inspired life of Mary, the mother of Jesus. Such a book was published; but the church authority forbade the reading of it, and Bossuet pointed out some of its indecent portions.

AGRICOLA, CHRISTOPH LUDWIG, 1667-1719; a landscape painter, who traveled in England, Holland, and France, and lived some time in Naples. His works are noted for skillful representation of varied phases of climate. In light and color he imitated Claude Lorraine.

AGRICOLA (originally **LANDMANN**), **GEORG**, 1494-1555; mineralogist, and the first to raise the study into a science. He studied at Leipsic and in Italy. In Bohemia he practiced as a physician, and, in 1531, was made professor of chemistry in a mining district of Saxony, where he pursued his favorite study. He published *De Re Metallica*, which gives minute descriptions of mining processes.

AGRICOLA, GNAEUS or **GNEIUS JULIUS**, a Roman of the imperial times, distinguished not less by his great abilities as a statesman and a soldier than by the beauty of his private character, was born at Forum Julii (now Fréjus in Provence), 37 A.D. Having served with distinction in Britain, Asia, and Aquitania, and gone through the round of civil offices, he was, in 77 A.D., elected consul, and in the following year proceeded as governor to Britain—the scene of his military and civil administration during the next seven years. He was the first Roman general who effectually subdued the island, and the only one who displayed as much genius and success in training the inhabitants to the amenities of civilization as in breaking their rude force in war. In his seventh and last campaign (84 A.D.), his decisive victory over the Caledonians under Galgacus, at a place called *Mons Graupius*, established the Roman dominion in Britain to some distance n. of the Forth. After this campaign, his fleet circumnavigated the coast, for the first time, discovering Britain to be an island. Among the works executed by A. during his administration were a chain of forts between the Solway and the Tyne, and another between the Clyde and Forth. Numerous traces of his operations are still to be found in Anglesey and N. Wales, and in Galloway, Fife, Perthshire and Angus. The news of A.'s successes inflamed the jealousy of Domitian, and he was speedily recalled. Thenceforth he lived in retirement; and when the vacant proconsulships of Asia and Africa lay within his choice, he prudently declined promotion. The jealousy of the emperor, however, is supposed to have hastened his death, which took place at the early age of 55. His life, by his son-in-law, Tacitus, has always been regarded as one of the choicest specimens of biography in literature.

AGRICOLA, JOHANN FRIEDERICH, 1720-74; a musical composer who studied under Bach. He was a superior organist, and held the office of kapellmeister under Frederic II. He wrote "Achilles" and other operas, and minor compositions.

AGRICOLA, JOHN (whose true name was Schnitter or Schneider, but who was also called Magister Islebius and John Eisleben, after the name of his native town), b. 1492, was one of the most zealous founders of Protestantism. Having studied at Wittenberg and Leipsic, he was sent, 1525, by Luther, who highly appreciated his talents and learning, to Frankfort-on-the-Main, to institute there, at the desire of the magistrates, the Protestant worship. On his return, he resided as a teacher and preacher in his native town of Eisleben, till 1536. In 1537, he became a professor at Wittenberg, where the Antinomian controversy, already begun between him and Luther and Melancthon, broke out openly. See **ANTINOMIANISM**. The troubles in which he was thus involved obliged him to withdraw, 1538, to Berlin, where he was reduced to extreme want, and was thus induced to make a recantation, never altogether sincere. He then found a protector in the elector John of Brandenburg, who appointed him preacher to the court and general superintendent. He made great exertions for the spread of the Protestant doctrine in the Brandenburg states; but ere his death, which took place at Berlin, 22d Sept., 1566, he had become as much hated for his share in the drawing up of the Augsburg *Interim* (q.v.), as he had formerly been for his Antinomian opinions. Besides his numerous theological writings, his country possesses a truly national work of his, entitled *Die Gemeinen Deutschen Sprichwörter mit ihrer auslegung* (common German proverbs, with their explanation; Hagenau, 1592; and a very complete but somewhat altered edition at Wittenberg, 1592). The patriotic feelings, pure morals and pithy language of this book have procured for it one of the first places among the German works of that age.

AGRICOLA, MICHAEL, a Swedish scholar and reformer, who, in the latter part of the 16th c., translated the New Testament into the Finnish language.

AGRICOLA, RUDOLPHUS, one of the most learned and remarkable men of the 15th c., and a chief instrument in transplanting the taste for literature, just revived in Italy, into his native country of Germany, was born 1443, in the village of Baflo, near Gröningen. His name was properly Rolef Huysmann (i.e., houseman or husbandman), which was

Latinized by him into A., after the usage of the time. He was also called Frisius, and Rudolf of Gröningen, from his native place; and sometimes Rudolf of Ziloha, from the monastery of Silo, where he spent some time. Having been first a disciple of Thomas à Kempis at Zwolle, he went to Louvain, then to Paris, and thence to Italy, where, during the years 1476 and 1477, he attended the lectures of the most celebrated men of his age. Here he entered into a close friendship with Dalberg, who afterwards became bishop of Worms. He was the first German who distinguished himself in Italy in public speaking and lecturing, and this he did not only by his erudition, but by the elegance of his language and the correctness of his pronunciation. He likewise acquired reputation as an accomplished musician, and his pieces were popular throughout Italy. On his return to Germany, he endeavored, in connection with several of his former co-disciples and friends, among whom were Alexander Hegius and Rudolphus Lange, to promote a taste for literature and eloquence in Germany. Several cities of Holland vainly strove with each other to obtain his presence, by offering him public functions; but not even the brilliant overtures made to him by the court of the emperor Maximilian I., to which he had repaid in connection with affairs of the town of Gröningen, could induce him to renounce his independence. At length yielding, 1483, to the solicitations of Dalberg, who was now chancellor to the elector palatine, and bishop of Worms, he established himself in the palatinate, where he sojourned alternately at Heidelberg and Worms, dividing his time between private studies and public lectures, and enjoying high popularity. He distinguished himself also as a painter; and at the age of 40 set with ardor to learn Hebrew, in order to study theology. He went again, 1484, with Dalberg into Italy, and died shortly after his return to Germany, on the 28th Oct., 1485. His fame rests chiefly on the personal influence he exerted. His compositions, which are written in Latin, are neither so numerous nor so important as those of many of his learned contemporaries. The first nearly complete edition of them was that published by Alard (2 vols., Cologne, 1539). Consult Tresling, *Vita et Merita*, R. A. (Gröningen, 1830).

AGRICULTURAL EDUCATION. In addition to the study of the theory and practice of scientific agriculture, the more prominent subjects under this head are chemistry, geology, biology, elementary natural philosophy, meteorology, and agricultural economics. *The theory and practice of agriculture* should embrace field demonstrations by qualified instructors, besides lectures on the following subjects: (1) Definition of agriculture: its relations to allied sciences. (2) Surface geology: soils—their properties; nitrogen in soils; the effect on soils of cultivation and the growth of plants. (3) Drainage; irrigation; wet-warping; top-dressing; liming, etc.; paring and burning. (4) Implements and machines—construction and careful management. (5) Steam cultivation. (6) The motive powers: 1st, man; 2d, horse; 3d, the mechanical powers. (7) Farm servants—labor and wages; details of horse and hand labor. (8) Rotations—reasons for their adoption; systems of farming. (9) Farm crops—selection and cultivation; insect injuries and diseases, and their prevention. (10) Grasses and other pasture plants—adulterations of seeds. (11) Management of permanent pastures—methods of making new pasture. (12) Weeds and means of destroying them. (13) Silage, and the system of ensilage. (14) Manures—farm-yard manure; special manures and “artificial”—their uses and adulteration; liquid manure and town sewage. (15) Farm buildings and fences, etc.—covered yards. (16) Live-stock—embracing cattle, pigs, horses, sheep, and poultry; the principles of breeding; feeding and management; cost of producing meat. (17) Dairying in all its branches. (18) Feeding stuffs—qualities and manure-values.

It is the function of agricultural chemistry, the most important of the allied sciences, to discover of what elements cultivated plants are composed, and how plants may most effectively be supplied with the materials necessary for promoting their growth without permanently exhausting the soil. This subject will, in its various aspects, be discussed under the heads, **VEGETABLE CHEMISTRY, MANURE, SOILS, ROTATION OF CROPS**, etc. The farmer should also know the elements of veterinary medicine (q.v.).

However important the branching off of education into this special track, it is only of late years that adequate attention has been paid to it. The first agricultural school was founded by Fellenberg at Hofwyl, in Switzerland, in 1806. His pupils were taken from the poorest class of peasantry, of whom he truly observed, that having “no other property than their physical and mental faculties, they should be taught how to use this capital to the best advantage,” by a combination of “discipline, study, and manual labor.” No fewer than 3000 pupils were trained in this school, which flourished for thirty years under the able direction of Wehrli. Since then, various institutions of the same character have sprung up on the continent. The French government makes large appropriations to support agricultural education, and one school at Grignon has an old royal palace with its domain of 1185 acres. One of the first duties undertaken by the new government of Marshal MacMahon, in 1873, was the nomination of a commission to reorganize the system of agricultural education. In Prussia, there is scarcely a province that does not boast its agricultural school and model farm; and, indeed, throughout Germany, as well as in Russia, we find educational institutions supported by the state, in all of which, with some slight difference of detail, agriculture is practically as well as theoretically taught. More re

cently, experimental stations have been established in various parts of the empire. Indeed the agricultural schools and field experimental stations in Germany are a credit to that country and a source of much attraction to visitors from other countries.

Finland possesses two agricultural colleges and eight smaller schools subsidized by the state. There are also fifteen small dairy schools and two higher schools, these latter forming departments of the agricultural colleges.

Denmark spends about \$55,000 annually. Japan has an agricultural college on the island of Yezo and an experimental farm in the province of Shimôsa near Tokio.

In Great Britain the only material support given is to a chair of agriculture at the normal school of science, South Kensington, a grant to the chair of agriculture in Edinburgh, and the payment of small grants to teachers in school and science classes, who include agriculture in their instruction. The main centres where a full course of agricultural education, associated with a suitably arranged curriculum of study in the allied sciences can be obtained are (1) the University of Edinburgh; (2) the Royal Agricultural College, Cirencester (founded 1845); (3) the College of Agriculture, Downton near Salisbury (founded 1880). There is only one degree associated with agriculture (instituted 1886), granted by the Edinburgh University. The chair in Edinburgh was founded and endowed in 1790. Practical agriculture is acquired by residence on a farm near Edinburgh, and by Saturday excursions to selected farms conveniently situated. In Aberdeen University a free annual course of lectures is given on agricultural subjects. In the University of Oxford, a professorship of rural economy was established in 1796. There are agricultural schools at Aspatria, near Carlisle, and at Alvercot Priory. The Albert Institution at Glasnevin, near Dublin, a great agricultural coll, has existed since 1838. Similar institutions in Canada have met with success, among them, the Agricultural College and Experimental Farm, at Guelph, Ontario.

The most important experimental station in England (a private one) is at Rothamsted and was founded in 1843 by Mr. (now sir) J. B. Lowes. Several thousands of pounds are spent annually, and sir John set apart £100,000 to provide the means for continuing the work after his death. Woburn station, the next in importance, was started in 1876 by the Royal Agricultural Society.

In the United States the West Point Academy, established in 1802, was the first provision by the general government for scientific education in any department; the naval academy followed in 1845. Two years later, John P. Norton, agricultural chemist, just returned from Europe, agitated the question of agricultural schools, and one school was begun. In 1860 it was liberally endowed by Joseph E. Sheffield, and is now attached to Yale College as the "Sheffield scientific school." In 1852, a legacy to Dartmouth College, by Abiel Chandler, laid the foundation of a similar branch at that college. Congress was repeatedly asked to set apart lands for the support of agricultural colleges, and a bill was passed in 1858 for that purpose, but the president failed to sign it. In 1862, the effort was successful, and a bill became a law appropriating about ten millions of acres to all the states, to be divided according to the number of representatives from each state in congress. Meantime, New York and other states kept the question alive, and Michigan opened her agricultural college in 1857; and now, under one or another name, nearly all the states have colleges or parts of colleges in which scientific agriculture is taught. On the 2d of July, 1862, congress passed an act giving public lands to the several states and territories which should provide colleges for the benefit of agriculture and the mechanical arts, the amount of land to be equal to 30,000 acres for each senator and representative in congress to which the states were then entitled. To guard against the loss of this fund by improvident investment, the act provides that all moneys derived from the land granted shall be invested in stocks of the United States or of the state, or some other safe stock yielding not less than five per cent.; and that if any portion of the fund or the interest thereon shall be lost or diminished, it shall be replaced by the state, so that the capital shall forever remain undiminished, except that a sum not exceeding ten per cent. on the amount received by any state under the act may be applied to the purchase of lands for sites or experimental farms, whenever authorized by the legislature. The general object and character of the colleges to be established is briefly stated in the fourth section of the act, which provides that the interest of the fund shall be inviolably appropriated by each state which may claim the benefit of the act, "to the endowment, support, and maintenance of at least one college, where the leading object shall be (without excluding other scientific and classical studies, and including military tactics) to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

The states quickly availed themselves of these advantages, and the sums originally obtained, amounting to many millions have remained unimpaired, with few exceptions. Michigan obtained \$8.38 per acre, but the land scrip of Maine was sacrificed at fifty-three cents per acre. In 1887 an act appropriating \$15,000 to each state to establish experimental stations in connection with these colleges was passed, and has had

a very stimulating effect upon the agricultural departments. In 1889 an act was passed appropriating from the sales of public lands to each state and territory for the more complete endowment and maintenance of colleges for the benefit of agriculture and the mechanic arts, \$15,000 for 1890, and an annual increase by \$1000 of the amount of such appropriation thereafter for ten years, and the annual amount to be paid thereafter to each state and territory was fixed at \$25,000. The act forbade the payment of money for the support of institutions making distinctions of race or color in the admission of students, but the establishment and maintenance of such colleges separately for white and colored students is held to be a compliance with the provisions of this act, and the funds must be equitably divided. The majority of these institutions have an officer of the army or navy detailed to act as professor of military science and tactics in accordance with a statute amended in 1888.

AGRICULTURAL AND MECHANICAL SCHOOLS IN THE UNITED STATES, 1896.

STATE.	Name.	Location.	Organized.	President.
Alabama . . .	Agricultural and Mechanical College	Auburn	1872	William L. Broun.
"	Southeast Alabama Agricultural School	Abbeville	1889	
"	North Alabama Agricultural School	Athens	1889	W. H. Council.
Arizona . . .	State Normal and Industrial School for colored	Normal	1889	
Arizona . . .	Agricultural and Mechanical Department, University of Arizona	Tucson	1889	Theo. B. Comstock.
Arkansas . . .	Arkansas Industrial University	Fayetteville	1871	John L. Buchanan.
"	Branch Normal College of the University, for colored	Pine Bluff	1889	J. C. Corbin.
California . .	Agricultural and Mechanical Department, University of California	Berkeley	1869	Martin Kellogg.
Colorado . . .	Colorado Agricultural College	Fort Collins	1879	Alston Ellis.
Connecticut .	Storrs Agricultural School	Storrs Station	1889	B. F. Koons.
"	Sheffield Scientific School	New Haven	1847	
Delaware . . .	Agricultural and Mechanical Department, Delaware College	Newark	1870	Albert N. Raub.
"	State College for Colored Students	Dover	1889	Wesley Webb.
Florida . . .	Florida Agricultural College	Lake City	1889	Oscar Clute.
"	State Normal and Industrial College for Colored Students	Tallahassee	1889	T. De S. Tucker.
Georgia . . .	State College of Agriculture and Mechanical Arts, University of Georgia	Athens	1872	H. C. White.
"	South Georgia Agricultural College	Thomasville	1879	
"	West Georgia Agricultural and Mechanical College	Hamilton	1881	
"	Middle Georgia Military and Agricultural College	Milledgeville	1880	
"	Georgia Industrial College for Colored Youths	College Station	1889	R. R. Wright.
"	North Georgia Agricultural College	Dahlonega	1871	I. W. Waddell.
"	Southwest Georgia Agricultural College	Cuthbert	1879	
Idaho	University of Idaho	Moscow	1889	Frank B. Gault.
Illinois . . .	Agricultural and Mechanical Department, University of Illinois	Urbana	1868	A. S. Draper.
Indiana . . .	School of Agriculture, Horticulture, and Veterinary Science of Purdue University	Lafayette	1874	James H. Smart.
Iowa	Iowa State College of Agricultural and Mechanical Arts	Ames	1869	W. M. Beardshear.
Kansas . . .	Kansas State Agricultural College	Manhattan	1863	Geo. T. Fairchild.
Kentucky . .	Agricultural and Mechanical College of Kentucky	Lexington	1866	Jas. K. Patterson.
"	State Normal School for Colored Persons	Frankfort	1889	John S. Jackson.
Louisiana . .	Agricultural and Mechanical Department, State University	Baton Rouge	1874	J. W. Nicholson.
"	Southern University and Agricultural and Mechanical College for colored	New Orleans	1889	H. A. Hill.
Maine	Maine State Agricultural and Mechanical College	Orono	1868	A. W. Harris.
Maryland . .	Maryland Agricultural College	College Park	1859	R. W. Silvester.
Massachusetts	Massachusetts Agricultural College	Amherst	1867	H. H. Goodell.
"	Massachusetts Institute of Technology	Boston	1865	Francis A. Walker.*
"	Bussey Institution of Harvard University	Jamaica Plain	1861	Charles W. Elliot.
Michigan . .	Michigan State Agricultural College	Agr. College Station	1857	L. G. Gorton.
Minnesota . .	College of Agriculture, University of Minnesota	Minneapolis	1867	Cyrus Northrup.
"	College of Engineering, Metallurgy, and the Mechanic Arts, University of Minnesota	"	1889	"
Mississippi . .	Agricultural and Mechanical College of Mississippi	Agr. College Station	1880	Stephen D. Lee.
"	Alcorn Agricultural and Mechanical College	Westside	1872	T. J. Calloway.
Missouri . . .	Agricultural and Mechanical Department, University of Missouri	Columbia	1870	R. H. Jesse.
"	Lincoln Institute, for colored	Jefferson City	1889	J. E. Page.
Montana . . .	Montana Agricultural College	Bozeman	1893	James Reid.
Nebraska . .	Agricultural and Mechanical Department, University of Nebraska	Lincoln	1871	Geo. E. MacLean.
Nevada . . .	Agricultural and Mechanical Department, University of Nevada	Reno	1874	J. E. Stubbs.
New Hampshire	New Hampshire College of Agriculture and Mechanic Arts	Durham	1866	C. S. Munkland.
New Jersey . .	Rutgers Scientific School, Rutgers College	New Brunswick	1865	Austin Scott.
New Mexico .	New Mexico College of Agriculture and Mechanic Arts	Mesilla Park	1889	S. P. McCrea.
New York . .	College of Agriculture, Cornell University	Ithaca	1868	J. G. Shurman.
North Carolina	North Carolina College of Agricultural and Mechanical Arts	Raleigh	1888	A. A. Holladay.
"	State Agricultural and Mechanical College for the Colored Race	Greensboro	1889	J. O. Crosby.
North Dakota	North Dakota Agricultural College	Fargo	1890	J. H. Worst.
Ohio	Agricultural and Mechanical Department, Ohio State University	Columbus	1873	William H. Scott.
Oklahoma . .	Oklahoma Agricultural College	Stillwater	1890	G. E. Morrow.
Oregon . . .	State Agricultural College of Oregon	Corvallis	1872	John M. Bloss.

AGRICULTURAL SCHOOLS AND COLLEGES IN THE UNITED STATES, 1896. — *Continued.*

STATE.	Name.	Location.	Organized.	President
Pennsylvania	Pennsylvania State College	State College Station	1859	Geo. W. Atherton.
Rhode Island	Rhode Island College of Agriculture and Mechanic Arts	Kingston . . . . .	...	John H. Washburn.
"	Agricultural and Scientific Department, Brown University	Providence	1869	E. B. Andrews.
South Carolina	College of Agricultural and Mechanical Arts	Columbia	1805	James Woodrow.
"	Clemson Agricultural College	Fort Hill	1889	E. B. Craighead.
"	Clafin University, Agricultural College and Mechanical Institute, for colored	Orangeburg	1869	L. M. Duntun.
South Dakota	State Agricultural College of South Dakota	Brookings . . . . .	...	Lewis McLouth.
Tennessee	Agricultural and Mechanical Department, University of Tennessee	Knoxville	1869	C. W. Dabney, Jr.
Texas	Agricultural and Mechanical College of Texas	College Station	1876	L. S. Ross.
"	Prairie View State Normal School, for colored	Prairie View . . . . .	...	L. C. Anderson
Utah	Utah Agricultural College	Logan	1883	J. H. Paul.
Vermont	University of Vermont and State Agricultural College	Burlington	1865	M. H. Buckham.
Virginia	Virginia Agricultural and Mechanical College	Blacksburg	1872	J. M. McBryde.
"	Hampton Normal and Industrial Institute, for Negroes and Indians	Hampton	1868	H. B. Fri'scl.
Washington	Washington Agricultural College and School of Science	Pullman	1890	Enoch A. Bryan.
West Virginia	Agricultural and Mechanical Department, University of West Virginia	Morgantown	1867	J. L. Goodknight.
"	West Virginia Colored Institute	Farm Station . . . . .	...	J. H. Hill.
Wisconsin	Agricultural and Mechanical Department, University of Wisconsin	Madison	1849	Charles K. Adams.
Wyoming	Agricultural and Mechanical Department, University of Wyoming	Laramie	1887	A. A. Johnson.

Of all institutions, 14 were exclusively for colored students. The following shows approximately the number of students pursuing courses of a technical nature in the institutions endowed by the national land grant; agriculture, 2,712; mechanical engineering, 2,413; civil engineering, 1,107; electrical engineering, 1,349; mining engineering, 163; architecture, 264; household economy, 321; veterinary science, 395; chemical engineering, 21; biology, 13; and military tactics, 7,741. The colleges for white students had a total of 8,289 acres of land under cultivation, valued at \$1,517,912, and those for colored students, 1,342 acres, valued at \$117,155.

In South and Central America agricultural education is receiving attention. The Argentine Republic has a school of agriculture. A practical agricultural school was opened at Santiago in 1885, and a college of engineering and agriculture was established in Ecuador in 1890. In the secondary "colleges" for boys in Costa Rica there are courses in agriculture, and the same is true of some of the special schools of Brazil.

AGRICULTURAL EXPERIMENT STATIONS. Departments of agricultural colleges, established under the act of the U. S. Congress of 1887, and intended "to promote scientific investigation and experiment respecting the principles and applications of agricultural science." They conduct researches with regard to the physiology of plants and animals, the advantages of rotative cropping as pursued under varying series of crops, the analysis of soils and waters, and the chemistry of manures, foods, etc. The act of 1887 appropriated \$15,000 annually for each state for the purposes of such stations. The officers of the stations report annually to Secretary of Agriculture, and publish bulletins giving a summary of the results of experiments. In 1893 there were 55 of these experiment stations in the United States, the best known being those at Auburn, Ala., Berkeley, Cal., New Haven, Conn., Champaign, Ill., La Fayette, Ind., Manhattan, Kansas, Amherst, Mass., St. Anthony Park, Minn., Lincoln, Neb., New Brunswick, N. J., Geneva, N. Y., Columbus, O., the State College, Penn., Knoxville, Tenn., and Laramie, Wyoming.

AGRICULTURAL SOCIETIES are associations for the purpose of promoting the science and practice of agriculture.

In the United States, where the land is mostly owned by those who farm it, these societies have sprung up in great numbers. Every state has its central society, which in its turn fosters a number of local associations. Indeed, in all the chief grain-producing districts, each county boasts of its own society. These being all partly supported by state money, useful information is collected, published, and sold at a cheap rate in reports. Canada follows in the wake of her enterprising neighbors, and supports by grants of money a provincial show in each province, while the co. societies are numerous, and supply materials for the reports of the boards of agriculture at Toronto and Montreal. In Canada and the U. S. the A. S. are of a highly popular character. Prizes are given, not only for animals, implements, and dairy produce, but also for fruits. Being more of a general nature, combining agriculture, horticulture, and domestic economy, such exhibitions are frequented by all classes. They are known as "fairs."

AGRICULTURE (Lat., *ager*, a field, and *colo*, I till) has come by usage to mean the cultivation and care of all vegetable and animal life supported by the earth for the benefit of man. It is sometimes considered as a science and sometimes as an art, and he who engages in it is sometimes called a farmer and sometimes an agriculturist. At least there can be made of agriculture the divisions of tillage, husbandry, grazing, dairying, feed-

ing, breeding, horticulture and arboriculture. Many other divisions of agriculture are referred to as a matter of usage. Agriculture as a science is based upon a group of sciences which in their growth have revolutionized it. The most important of these are included under the terms chemistry, botany, zoölogy and geology.

With a few exceptions the spontaneous growth of nature affords only a limited food supply. This supply cannot be greatly increased by the products of the chase. The population of a given area remains small even after the wild animals have become the property of man, and these have been made the rude beginnings of agriculture found among a pastoral people. It is only after those plants yielding man an abundant supply of food have been selected and made the object of cultivation that population augments and civilization takes its rise. Man has selected certain animals and plants which, modified by locality and circumstances, have furnished him food and clothing, and have become almost inseparable from agriculture and civilization. Animals, too, have been his co-workers; without the ox and the horse the development of agriculture, which supports civilization, would be impossible. In northern latitudes wheat, barley, oats, rye and the potato are the chief food plants. These crops are most productive when grown in summer in the temperate climates of the earth, being unsuited to the heats of the torrid zone. Their geographical limits, however, are greatly extended by growing them as winter crops on the borders of and even within the tropics. In these regions, however, rice, Indian corn, millet and other grains become far more productive of food than the already-mentioned cereals are in high latitudes, as they flourish during the heats of summer. Where heat and moisture are almost perennial in the tropics, the banana, the bread fruit tree and other herbaceous plants and trees are most productive of human food.

Agriculture is one of the oldest of human employments, dating from long before the dawn of history. The inhabitants of the lake dwellings of Switzerland were, perhaps, the earliest tillers of the soil and stock-keepers about whom we know. Among their dwellings we find the bones of cows, pigs, sheep and goats, as well as of wild animals. Grain crushers were in every dwelling. Wheat, barley, millet and flax seem to have been cultivated. The Aryan (q.v.) peoples are believed to derive their name from a word which indicated that they were the users of the plow, and were thus distinguished from other peoples.

Most of our knowledge of the earliest agriculture clusters about the river valleys—that of the Nile in Egypt, and that made by the Tigris and the Euphrates. In Oriental agriculture the great need is water. In Egypt once a year the Nile came to the relief of man, gave him the water for a crop, and prepared the bed for the seed. It was claimed by Sir Isaac Newton that agriculture began in the Nile valley, and that the river taught men the art. The teeming population that anciently existed in that narrow valley, the large army maintained, and the great engineering and architectural works constructed indicate a successful cultivation of the soil. Rain is rare in Upper Egypt, and fertility is maintained only by the water of the Nile, which annually overflows. The inundation, unless prevented by embankments, covers the whole land, and occurs at the hottest season. In ancient times the crops, or at least the winter crops, were sown upon the soft mud dressing left by the river. These crops consisted of wheat, barley, lentils, beans, flax, lupines, etc. The time of the maturity of these crops depended upon the amount of the overflow. They were generally ready for the harvesting by the end of April, and sometimes a month earlier. After these crops summer crops could be raised by means of constant watering. Among the summer crops were rice, indigo and durra. The latter was probably the most important crop. It was gathered in July, and was apparently the food of the poorer people. By means of watering three crops were sometimes raised. There were also a great variety of other crops considered by good authority to be much the same as those at present produced. The ancient Egyptians were in the habit of covering their monuments and burial-places with representations of the occupations of life. These, as collected in the works of Rawlinson and Wilkinson, give us full and accurate information in regard to their agricultural practices. Sometimes seeds were merely thrown upon the mud and trodden in. When it was necessary, as it generally was, to stir the soil, the tiller sometimes used a rude pick made of two pieces of wood tied together. From this pick there was an easy transition to a rude plow made by lashing together a pointed share, two handles and a pole. The yoke for drawing this was sometimes fastened to the shoulders and sometimes to the horns of oxen. It is evident that the plan was used in Egypt more than five thousand years ago. From the representation it appears that the sowing was always broadcast, and that the harrow and the rake were unknown. Wheat heads were cut from the standing stalks, gathered in baskets, and carried to the threshing floor, where the grain was trodden out by oxen. Durra was pulled up by the roots and was bound in bundles after the soil had been brushed off. The dry heads were broken by drawing the stalks between sharp points. The inundation of the country and the necessity of retaining water for irrigation led to extensive systems of dykes and sluices. A vast amount of labor was expended in providing irrigation by means of the *shadoof* and other simple contrivances. For clothing the Egyptians produced flax in large quantities, cotton in small quantities, and wool. Sheep were not esteemed for food, but they gave two fleeces

a year. The evidence is conclusive that there were large herds of cattle, some without horns, and that flocks and herds were most carefully tended.

Of Babylonian agriculture there are few records. As in Egypt, a dense population was supported. The Euphrates overflowed, but did not do the work of the Nile. In all the region irrigation turns desert lands into fruitful fields. Of such fields said Herodotus: "This is of all lands with which we are familiar by far the best for growth of corn. When it produces its best it yields even three hundredfold. The blades of wheat and barley grow there to full four fingers in breadth; and though I well know to what a height millet and sesama grow, I shall not mention it, for I am well assured that to those who have never been in the Babylonian country what has been said respecting its productions will appear incredible."

The scriptures are full of allusions to the operations of the husbandman in Palestine as well as in Egypt. The operations in the two countries necessarily formed striking contrasts, the crops in the former being dependent on the rains for growth, in the latter upon the inundations of the Nile. The Hebrews, before their sojourn in Egypt, had been a semi-pastoral people, and they must have learned something of Egyptian agriculture during the years of bondage. Their laws were those of an agricultural people. Land was practically inalienable. Extensive plains of fertile soil yielded the finest wheat. The hill-sides were covered with vines and olives, often planted in terraces formed with much labor to afford a large mass of soil in which the plants might flourish in the almost rainless summer. The valleys were well watered, and afforded pasture for numerous flocks. Of the smaller cultivated plants, millet was the chief summer crop, but it was cultivated to only a limited extent, being confined to those spots that could be artificially watered. Wheat and barley were the chief cereals, as the winter rains were sufficient to bring them to maturity. Little is known of early Grecian agriculture or of the fifty writers on agriculture referred to by Varro. Hesiod (700 or 800 B.C.) was a poet who, in his *Works and Days*, mingled agricultural directions and thrifty proverbs. We learn that the Grecians knew of the value of scarecrows, and when these failed, had a sure charm produced by carrying a toad about the field by night and then burying him in the middle of it. The plow was much like the Egyptian, as was the mode of threshing wheat. Unlike the Egyptians, they had the harrow. Summer fallows were in use, and the ground received three plowings: one in the autumn, another in the spring, and the third immediately before sowing the seed. Manures were used and soils were combined for fertilizing purposes. The land doubtless was better wooded, better watered, and had agricultural possibilities greater than those of to day.

Roman agriculture has received special attention since so much was written about it by the Romans themselves, and since they carried it into other countries where it modified or dominated agricultural customs. When Rome was only a colony on the Tiber, land was divided among the citizens in small allotments. There was a domain of public land which was continually extended by the conquests of neighboring States and the partial confiscations that followed. Although land in the conquered territory was sometimes granted to the poorer citizens, there were large tracts of public lands that were either cultivated or allowed to remain in pasture. The common conditions were that the occupants paid one tenth of the produce of the corn lands, one fifth of the produce of vines and fruit trees, and a moderate rate per head for cattle pastured. The occupants were merely tenants at will, and theoretically the state could resume or sell the lands at any time. Yet the right of possession was good against all until the lands had been resumed; and in process of time there came to be families so long in possession that they could not be dispossessed. Only the wealthy had the cattle or slaves that made such occupation possible. The burdens upon these occupiers of the public lands were much less than those upon the small farmers who owned their farms. Thus at least two classes of cultivators were in existence, the small proprietors and the wealthy tenants holding the lands of the state. An addition to the strife between these two classes was the pressure brought to bear in the interest of the landless. Even after the Romans became masters of all Italy little more than four acres was assigned to each citizen, and the domain lands increased enormously. Attempts were constantly made to restrict the extent of land that could be occupied by the wealthy, but generally without effect. (See AGRARIAN LAW.) A great deterioration and a consequent agricultural change took place during the century that followed the first Punic War (ended B.C. 241). The place of the small farmer was taken by the planter, who cultivated a great extent of territory, using slave labor. The small proprietors either sold their no longer profitable farms, or were driven from them by the large land-holders. In Sicily, the first province, and in the others successively, the ownership of the land was vested in the Roman people. From these provinces came the tribute of grain that made grain-raising unprofitable in Italy. Hence the large estates were gradually given over to the keeping of flocks and the raising of cattle. Among the Roman writers upon agriculture were Varro, Columella, and Pliny. Earlier than these in time and more celebrated was Cato the Censor (d. 150 B.C.), who gives us not only the most minute particulars regarding the management of the slaves on his large Sabine farm, but also all the details of husbandry, from plowing to the reaping and threshing of the crop.

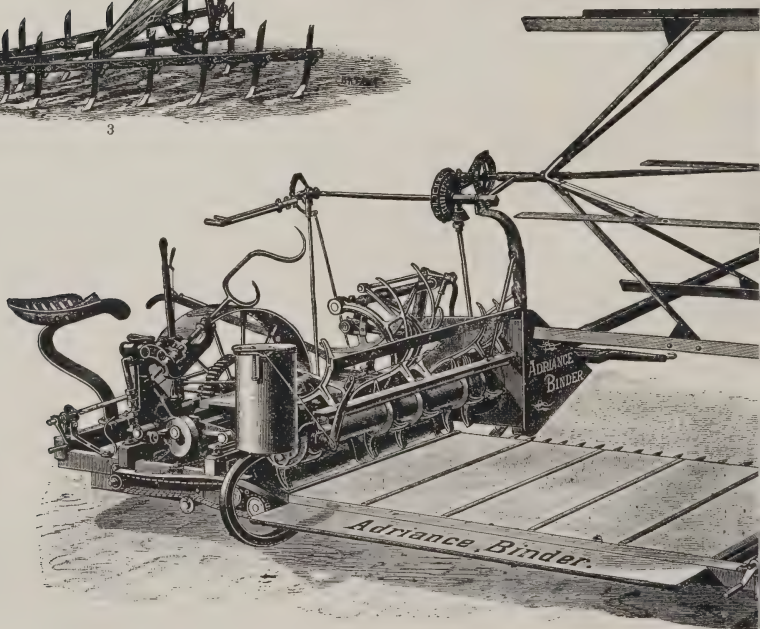
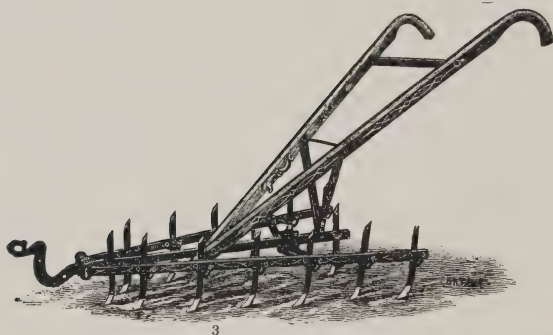
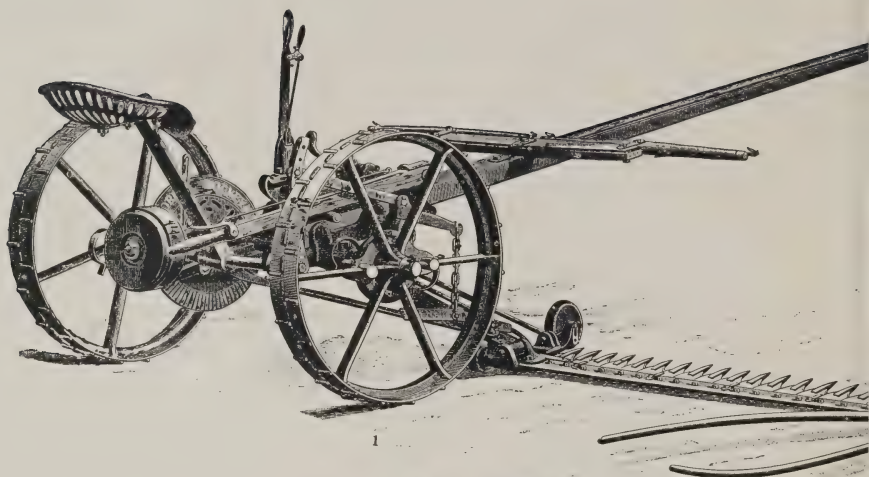
Among the agricultural works in Latin were those of Mago the Carthaginian. The translating had been done by order of the Senate, and Columella speaks of Mago himself as the author of husbandry.

The chief grain cultivated by the Romans was wheat, but barley was cultivated to a considerable extent. Land given to grain was fallowed for the whole of every alternate year. One third of the fallow was manured and sown with some green crop, as cattle food. Fallow received from four to five furrows before the wheat was sown in the fall. The crop of wheat ripened about the middle of June, but the summers were too dry to allow of millet and other summer crops being raised with certainty. Rye, hemp, flax, beans, turnips, lupines, vetches and lucerne are also mentioned as occasionally cultivated. Meadows were highly esteemed, and irrigation to some extent adopted. Cattle were fed on the plains in the winter and driven toward the Apennines as the snows melted in spring and when the pastures below became parched by the heat. The Romans carried their agriculture into the ruder countries conquered by them. The vine growing wild in Sicily was carried into Gaul, where it was acclimated with difficulty. To the rude Britons the Romans taught agriculture so successfully that before the period of occupation was over they were exporting large quantities of grain.

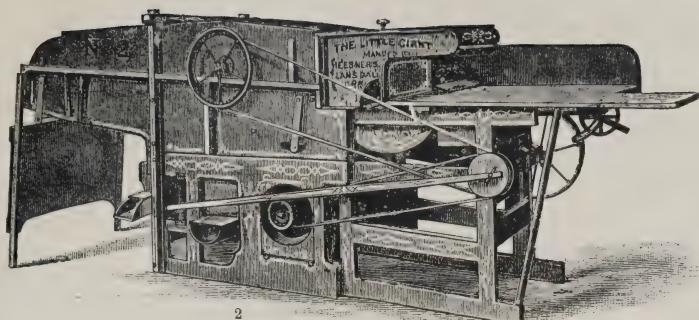
The deterioration of Roman agriculture was accelerated by the overthrow of the Roman Empire. The conquering nations had advanced but little beyond the pastoral stage. During the following period of the Dark Ages the two influences working for the benefit of agriculture in Western Europe were from the Saracens in Spain and the religious houses in the other countries. The Saracens irrigated and tilled with untiring industry. Introducing the plants of Asia and Africa, they cultivated rice, cotton and sugar, and covered the rocks of Southern Spain with fruitful vines. In general throughout Western Europe land was cheap, and many worthless tracts were given to the church. In some of the religious orders labor with the hands was imposed upon the members. They studied the works of the Roman writers upon agriculture, and soon had the best cultivated lands in those countries through which their influence extended. Charlemagne encouraged the planting of vineyards and orchards. On the whole, the Crusades helped the agriculture of Western Europe. In the latter part of the Middle Ages the people of the low countries of Western Europe came to be as distinguished for their agriculture as for their commerce and manufactures. They plowed in green crops; those of Holland developed dairying; the Flemings gained the reputation of being the oldest practical farmers. Also in the plain of Northern Italy, watered by the Po, agriculture was in an advanced condition. A large part of it of great natural fertility drew forth the praises of Polybius, who visited it about fifty years after it came into the hands of the Romans. In the thirteenth and fourteenth centuries, under the influence of irrigation, the region became a garden, supporting a large population and exporting grain. In the England of the same period the agriculture showed alternations of indolence and bustle, of feasting and semi-starvation. In August, 1317, wheat was twelve times as high as it was in the following September. Rye was the bread stuff of the peasantry. Little manure was used. Oxen, not horses, were used for teams. In the fourteenth century serfdom disappeared from England, and the tenant farmer became established. "Between 1389 and 1444 the wages of agricultural laborers doubled; harvests were plentiful; beef, mutton, pork became their food; sumptuary laws against extravagance of dress and diet attest their prosperity" (Prothero). Laborers without food could earn a bushel of wheat in two days and a half; of rye in a day and a half.

By the beginning of modern history the fruitful lands of Western Asia and South-eastern Europe, swept by wars and desolated by conquest, had been placed under the ban of the Turk. The conquest of the Moors in Spain and their subsequent expulsion caused an injury to the agriculture of the peninsula not since repaired. The discovery of the New World showed two grades of agriculture carried on by those who had never seen the horse and were practically without domestic animals. Even the careful tillage of the ancient Peruvian had no influence upon Europe and little upon the America of succeeding centuries. The great contribution of America to the world's agriculture was the three plants, the potato, tobacco and Indian corn or maize. In the region north of Mexico the labor of planting and caring for the scanty crops was performed by the women, who broke the ground with the rudest possible implements.

The leading English agricultural writer of the sixteenth century was Sir Anthony Fitzherbert, who published his *Book of Husbandry* in 1523. In this century agriculture became more profitable, enclosures were made, and the rights of common were greatly restricted. Turned from the former wool exportation, the farmers began to raise wheat in large quantities for exportation. A law in the middle of the century practically prevented grain exportation, and turned wheat lands into pasturage. The resulting high price of food and destitution on the part of laborers brought another reaction, and a replowing of grazing lands. The sixteenth century saw the end of villeinage. In 1595 laborers without food, during the summer months worked six days for a bushel of wheat, four days for a bushel of rye, and three and one half days for a bushel of barley. Gardening, greatly neglected in the first part of the seventeenth century, received due attention in the latter part. Deep drainage, too, began to be talked about. From the middle of the seventeenth century to the nineteenth England looked to Flanders for the perfection of careful tillage. From Flanders of the seventeenth century Sir Richard



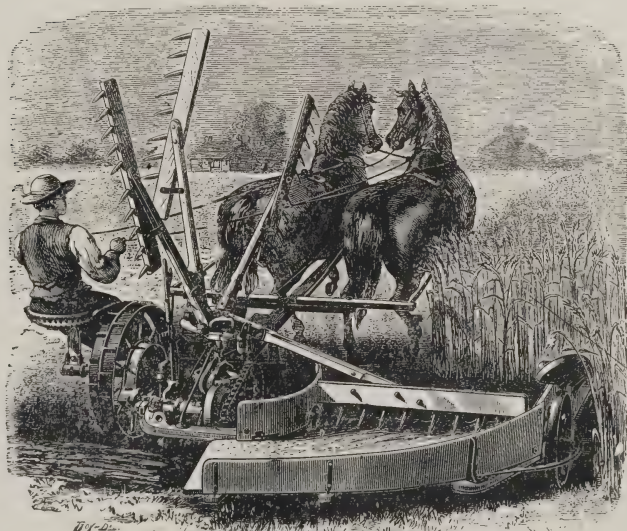
AGRICULTURE.—I. Mower. 2. Horse threshing and cleaning machine. 3. Harrow. 5. Binder.



2



4



6

und cultivator. 4. Binder in operation. 5. Sheaf binder. 6. Reaper in operation.

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Weston brought turnips and red clover, and Arthur Young afterward called him a greater benefactor than Newton. By the end of the century turnips and clover were extensively cultivated in alternation with wheat. The eighteenth century saw revolutions in English farming. One came when Lord Townsend established the Norfolk system. Under this system of first, wheat; second, turnips; third, barley; fourth, grass, one half of the land was constantly under grain crops and the other under cattle crops. Large numbers of sheep and cattle were fattened on the turnips, and the consumption of roots on the land increased the yield of the barley. The Norfolk system was a success from the beginning. The rental of certain farms increased fivefold, and farmers in special cases made handsome fortunes. Susceptible of many modifications, it has had much to do with the improved agriculture of England.

Another revolution came from the breeding experiments of Bakewell, commenced in 1750. To mention a single point, it had taken three or four years to prepare sheep for the market; those bred by Bakewell were prepared for the market in two years. Besides making a reputation and a fortune for himself, he made for others a way since followed in breeding.

English agriculture of the first part of the nineteenth century was marked by the influence of Arthur Young, who traveled much, carefully observed, experimented somewhat, and wrote industriously. He was one of the first to make experiments in regard to nitrogen and in regard to ammonia, previously supposed to be injurious to vegetation. Of his works, one has recently been republished. As secretary of the Board of Agriculture, established in 1793, he was concerned in the discussion of all the agricultural questions of the period. Jethro Tull, whose book on *Horse-hoeing Husbandry* appeared in 1731, was almost in touch with the methods of the nineteenth century. His theory was that seeds should be sowed in drills and the spaces between the drills kept thoroughly cultivated. He asserted that the plant lives upon minute particles of soil, and obtains food from the air when the soil is brought to dust. He invented a drill and a horse-hoe. He did not succeed in obtaining a large crop; but modifications of the method have since been made, and nearly thirty-six bushels to the acre secured. Considering that Tull did not have the aid of agricultural chemistry, he could not more nearly have touched hands with the scientific observers of to-day. In one respect there is an approach to his position. The supposed proof that plants cannot take nitrogen from the air has been questioned since 1880. At present it is generally accepted that certain (if not all) plants do acquire the plant food nitrogen from the air. (See *Experiment Station Record*, III., 111.) The theories of Tull may acquire fresh interest through the present discussion of the relations of the physical properties of the soil to the cultivation of plants.

The white colonists of North America had much to discourage them as agriculturists, and in New England the additional drawbacks of long winters and a rocky soil. The colonists in Virginia found both Indian corn and tobacco, the latter fitted to become an article of export. The New England settlers brought with them English modes of farming. From the Indians they learned how to raise corn, breaking the soil with a hoe and manuring with fish. Corn was the great product to be depended upon, although other grains were cultivated, and cattle and sheep increased slowly fed first upon the native grass, then upon herd grass specially fitted for New England soil.

Potatoes began to be raised in the first part of the eighteenth century. The Southern colonists, more favored by nature, made less actual progress than those of the North. An important part of the little written upon agriculture was the volume of essays published by Jared Eliot (q.v.), 1735. Even as late as 1790, as we learn from McMaster's *History of the American People*, little progress was made. In New England and New York, as well as farther South, barns were small, implements rude, and carts more common than wagons. In Georgia the hoe was more often used than the plow; in Virginia the poor whites threshed their grain by driving their horses over it. Throughout the South it was the common practice to grow crops without rotation, and in general manure was thrown away. A little later came the invention of the cotton gin and the beginning of the reign of cotton, with a demand for fresh fields and a disregard of careful tillage. Early in the century the importation of the Spanish merino sheep changed the farming of the North, and greatly increased the production of wool.

Most marked changes have taken place in the agriculture of the past fifty years, no small part of which has been connected with the development of agricultural chemistry. That development began early in the century with Sir Humphry Davy, who in 1813 published *Elements of Agricultural Chemistry*, a work translated into French and German. It was followed in 1840 and later by the works of Liebig. It has been continued in the researches and experiments of the laboratories of Europe and America. For English-reading agriculturists the experiments most prominent are those carried on since 1843, at Rothamsted, in England, by Sir John Lawes and Dr. Gilbert. (See Warrington's *Lectures on Rothamsted Experiment Station, Depart. of Agriculture*, 1892.) Among the results of the study of agricultural chemistry have been an extensive use of chemical fertilizers, selected with reference to soil and crops and a comparative independence of the fixed rotations. Researches, however, are not confined to agricultural chemistry. As carried on in the 320 experiment stations of the world they are arranged

to attack one after another the pests and the problems that confront the farmer. (See AGRICULTURAL EXPERIMENT STATIONS.)

One of the features of the agricultural history of the past fifty years has been the extensive introduction of machinery. Sowing machines, cultivators, and all the machines that displace the hoe are of comparatively recent invention. As early as 33 A.D., according to Pliny, the Gauls used a cart with projections in front which cut or tore off the heads of grain; but until recent times little effort was made to invent or introduce labor-saving machinery, owing to popular prejudice. The threshing machine was not invented until 1786, and though an attempt was made early in the century to construct reaping machines, but small success was made until the time of Bell, Hussey and McCormick. (See REAPING.) In the hay harvest horse power is applied by means of the mowing machine, the hay tedder, the rake, and machines for loading and unloading the hay. Another class of machines like the one for threshing deal with the gathered crops. The use of a system of machinery like that applied to dairying has made great changes in certain lines of agriculture. From horse power, too, there has been a partial change to steam power. About the year 1850 the steam plow began to be used in England. One special advantage in the minds of English farmers was the depth to which the soil could be turned, while the engine was utilized for many purposes on the large estates of that country. The great advantage of steam farm machinery in America has been for operations like that of threshing. Improved farm machinery in America has made possible the rapid settling of the new States and the successful gathering of their immense harvests. It has made possible the great farms where the furrow is plowed for miles and the line of harvesters sweep across wheat fields covering thousands of acres. Machinery has destroyed the advantage that might be possessed by the country with cheap labor, when pitted against the country with cheap land. It is claimed that on the largest farms of the West, by the use of improved farm machinery, wheat can be produced at an expense of \$5 per acre, or less than half the average cost per acre of the United States. The agricultural history of the half century has shown the risks that attend the production of a staple that must compete for the markets of the world. There has been a lowering of cotton as the result of over-production; but the product open to the greatest competition is wheat. In England, from 1851 half way to the present, wheat and dairy products rose in value, being at times more than 50 per cent higher than in 1851. In England, in the fall of 1894 the price of wheat was as low as 52 cents per bushel, which was less than 50 per cent of the price of 1851. The lowering of prices has increased the pasturage by millions of acres, has thrown out wheat land until the average production has become 28 bushels per acre, and has lowered rents in some cases more than 50 per cent. In the years 1895 and 1896 the price of wheat rose, and in the U. S. No. 2 winter wheat was quoted at 94¢ in the Chicago market in November, 1896. In the United States the average product for 24 years is 12.4 bushels per acre. There is a movement in agriculture to provide for local demands, to take advantage of growing centres of population, to strive for excellence and exact system in place of haphazard methods. The evaporator has broadened the fruit market. The canning industry has utilized fruits and vegetables and saved the agricultural balances in sections. Cold storage, rapid transportation, and the refrigerator car have reduced risks and shortened apparent distances. New Zealand is in the markets of London. Canada and the United States have a profitable apple trade with England. The expenses of transportation have been reduced to a fraction of the previous cost, and thus the wheat lands of Dakota have been laid alongside those of both New England and Old England, with gain for the one and with loss for the others. In dairying there has been one of the triumphs of recent agriculture. Specialization, with scientific method and improved machinery, has brought excellence without the destruction of the market. Dairy products, in contrast with others, are higher than they were fifty years ago. Carried on largely as co-operative undertakings, creameries and cheese factories (see DAIRY) have increased in Europe and America. A large industry in England, dairying on the co-operative basis has been on the increase in France. The Netherlands, famous for its careful agriculture, is a leading dairy country, exporting on an average 115,000,000 lbs. of butter and 64,000,000 lbs. of cheese. Switzerland, although furnishing a market for 2,000,000 lbs. of butter, on an average provides other markets with 33,000,000 lbs. of cheese. Denmark no longer competes for the wheat trade, but has become one of the most successful of dairy countries, one in which second-grade products are practically unknown. The amount of butter exported has steadily increased, and in 1891 was 100,000,000 lbs. England took nearly all of this, and in addition more than as much more from Canada, the United States, and other countries.

The past fifty years has been a period of careful cultivation, though with many exceptions in America. Thorough drainage and deep plowing, established in England, have been also made American. The storing of green crops in silos has become common. A great amount of intelligent work has been given to securing plants and trees, like the Russian fruit trees, suited to local conditions in cold climates. In the vicinity of the large cities market gardening has been a profitable branch of agriculture, and

has been the culmination of careful cultivation. Somewhat similar to it has been an industry which has developed in the United States under the name of "truck farming," and is carried on in places remote from markets. A large part of the vegetables consumed in the large American cities come from places from 500 to 1500 miles distant. According to a census bulletin, issued in 1891, in the United States upward of \$100,000,000 of capital is invested; 500,000 acres are given to it; more than 230,000 persons are employed, and the annual return is \$76,000,000. The South Atlantic States are largely interested in this "truck farming," which, under favorable conditions, is generally very profitable.

In speaking of the agriculture of the United States, besides branches touched upon, reference should be made to tobacco grown widely and a leading crop in fifteen states; to the sugarcane grown chiefly on the alluvial lands of the Mississippi; to rice grown profitably in the swamps of certain Southern States; to the successful tropical and sub-tropical products of Florida and California; and to the immense flocks and herds of the "ranches" in the mountain region and on the great plains of the western half of the continent.

In the West since 1880 irrigation has been employed on a large scale in an attempt to reclaim land within the arid belt, a region extending from the centre of Kansas and Nebraska to the furthestmost Pacific coast range of mountains. In that region of scanty rainfall irrigation may be practised by taking a water supply from the large streams flowing from the mountains. Within a small area water may be obtained from the "underflow" by means of artesian wells. While the results of surveys show that only a comparatively small part of the belt can be irrigated, in certain localities thousands of acres are being made profitable. In two valleys of Arizona (the Salt and the Gila) more than 450 miles of irrigating ditches were opened in the ten years 1880-1890. In the single county of San Bernardino, Cal., irrigation increased the number of acres under cultivation from 18,400 in 1880 to 144,950 in 1890. (See IRRIGATION; ARTESIAN WELLS, and also SPECIAL REPORTS OF DEPARTMENT OF AGRICULTURE.)

In the agriculture of Europe the sugar-beet has become a prominent industry in Germany, Austria-Hungary, France and Russia, and of some importance in Belgium and the Netherlands. Germany grows more than one third of the product, and the four countries more than nine tenths of it. The vine is of importance in all the Mediterranean region and in favored localities like those along the German Rhine, where vineyards have given an average net return of more than \$100 per acre. Italy gives to the vine 9,000,000 acres; and France, with lowest acreage in 1891, and larger before and since, gives on an average 5,000,000 acres. France, also dating its progress from the Revolution, has become one of the richest of agricultural countries, and previous to 1874 was the greatest wheat-producing country of the world. It is marked for its small farms and thrifty agricultural class, more than half of whom are land-owners. Germany, the greatest potato-producing country of the world, is also a country of varied agricultural production. Belgium, secure in its past record, is successfully conservative in its present. Austria-Hungary, less than half a century from practical serfdom, has a government that fosters agriculture, and presents the sharp contrasts illustrated by the steam cultivator on large estates and the wooden plow on small farms. Russia, only thirty years from serfdom, shows agricultural methods in sharp contrast with an immense agricultural production.

The garden of Italy is the Lombard plain, with its more than 1,600,000 acres of irrigated land and its careful systems of cultivation. In Spain, despite vines, oranges, olives, and the possibilities of irrigation and a succession of crops, agriculture looks backward to the time of the Moor.

China, with an agriculture unchanged from legendary times, and India are countries in which rude implements are overbalanced by irrigation and garden-like cultivation. With rice as a principal food product, they support a dense population, have a great variety of crops, and are increasing factors in computing the world's supply.

Australasia and probably South America must be carefully considered in all agricultural estimates for the future. There are agricultural possibilities, too, in Mexico, with its three annual harvests in one part of the country and its grain production, although, from want of transportation, products are sometimes three times as high in one section as in another.

The following tables, compiled from the returns and estimates of the United States Department of Agriculture, are for the most part averages covering several years. In many cases countries are known to produce cotton and other articles, although not even estimates that are trustworthy can be made of the quantity of the product. Of these averages those for wheat are the most trustworthy; those for cotton are probably the least so. An examination of the tables shows how small, in comparison with the supply, is the market for agricultural products, and how extensive is the field from which that supply can be drawn. On the averages of the table the world's wheat product is about 2300 million bushels, while the estimates are 2393 million bushels for 1892, and 2385 million bushels for 1893. The United States supplies the cotton for more than half of the civilized world; India, Egypt and Brazil supply most of the remainder. China produces large quantities, and Russian Asia an increasing supply.

AGRICULTURAL PRODUCTS OF THE WORLD.

	MILLION BUSHELS.						MILLION POUNDS.		
	Wheat.	Corn.	Rye.	Barley.	Oats.	Potatoes	Cotton.	Tobacco.	Wool.
AFRICA :									
British Africa.....	4	3	....	....	....	....	....	....	129
Egypt.....	10	13	....	10	....	....	305	....	3
French Africa.....	22	....	....	35	....	....	....	....	....
Several Countries.....	4	....	....	....	....	....	150	....	....
AMERICA :									
Argentine Republic.....	29	19	..	....	....	....	....	....	377
Brazil.....	....	....	....	....	....	....	144	No data	....
Canada.....	40	6	2	22	90	....	....	....	12
Chile.....	15	1	....	3	....	....	....	....	....
Mexico.....	10	79	....	....	....	....	....	No data	....
South America, parts of	....	....	....	....	....	....	....	No data	....
United States.....	440	1,681	25	55	595	170	3,262	499	281
ASIA :									
China.....	....	(Data in most cases wanting)	....	....	....	....	570	No data	....
India, etc.....	255	....	....	....	....	....	1,235	No data	72
Japan.....	14	1	22	32	....	2	138	41	....
Western Asia.....	146	....	....	....	....	....	48	....	121
Several Countries.....	....	....	....	....	....	....	No data	53	....
Australasia.....	36	7	....	3	17	16	17	4	550
EUROPE :									
Austria-Hungary.....	161	110	122	98	154	409	....	134	54
Belgium.....	18	....	17	4	27	99	....	7	4
Bulgaria.....	40	21	20	22	9	No estimate	....	5	....
Turkey.....	38	....	....	....	....	....	....	....	....
Cyprus and Malta.....	1	....	....	2	....	....	5	....	....
Denmark.....	5	....	17	23	31	13	....	....	....
France.....	309	27	69	51	246	397	....	44	104
Germany.....	93	....	228	101	300	892	....	91	55
Greece.....	7	....	....	2	....	No estimate	....	17	....
Italy.....	122	81	4	9	17	27	....	10	26
Netherlands.....	6	....	11	5	12	63	....	6	....
Norway and Sweden.....	4	....	21	19	63	69	....	2	3
Portugal.....	8	14	5	2	1	8	....	....	10
Roumania.....	50	61	4	19	8	2	....	7	....
Russia.....	242	20	723	154	576	464	....	....	292
Servia.....	8	11	2	3	2	No estimate	....	3	....
Spain.....	73	22	21	49	7	No estimate	....	....	66
Switzerland.....	3	2	2	1	5	....	....	4	....
United Kingdom.....	78	2	2	80	167	228	....	....	147
Total (about), including other countries.....	2,300	2,300	1,318	804	2,327	Doubtful	Doubtful	Doubtful	2,500

MARKETS OF THE WORLD FOR AGRICULTURAL PRODUCTS.

	MILLION BUSHELS.						MILLION POUNDS.		
	Wheat.	Rye.	Barley.	Oats.	Corn.	Potatoes	Wool.	Cotton.	Tobacco.
Austria-Hungary.....	....	1	....	....	5	....	32	186	17
Belgium.....	19	1	7	....	....	2	89	49	20
Canada.....	....	....	....	....	2	....	8	26	12
Denmark.....	....	2	....	2	2	....	....	....	8
France.....	37	....	2	16	14	....	289	246	49
Germany.....	19	29	19	14	9	....	213	383	76
Italy.....	20	....	....	....	2	....	18	124	34
Japan.....	....	....	....	....	....	....	....	29	....
Netherlands.....	9	8	4	....	8	....	4	26	29
Norway and Sweden.....	2	12	1	....	....	....	6	30	11
Russia.....	....	....	....	....	....	....	....	276	....
Spain and Portugal.....	10	....	....	....	1	....	6	119	42
Switzerland.....	11	....	1	3	1	....	4	53	12
United Kingdom.....	106	1	36	48	61	5	239	1,491	55
United States.....	....	....	10	....	....	3	89	....	....

Agricultural societies for the purpose of promoting the science and practice of agriculture began with one established in the north of Italy in the beginning of the last century. In 1723 a "society of improvers in the knowledge of agriculture in Scotland" was instituted, but was short-lived, as was another founded in 1755. In 1783 the Highland and Agricultural Society was formed, and in 1834 it was incorporated by a royal charter. Originally designed for the improvement of the Highlands, it extended its opera-

tions over the whole of Scotland. Its capital enables it to carry on experiments, conduct competitive trials and offer large prizes. The Royal Agricultural Society of England, founded in 1838, has over 10,000 members, holds annual shows, and publishes a quarterly. It has the income of a permanent fund of about \$175,000 besides the annual dues, and undertakes many duties which in other countries are undertaken by the government. The society has conducted competitive trials of farm machinery, conducted a chemical laboratory, and carried on work in connection with all the departments of rural economy. In the journal of the society have appeared the details of the experiments of Lawes and Gilbert during the past fifty years; and the journal itself has represented during fifty years the best to be obtained by an English reading agricultural public. In Ireland agricultural interests are looked after by the agricultural department of the Irish Land Commission and by a department of the Royal Dublin Society, chartered in 1749. The annual horse show, held by the society in Dublin during the month of August, is of marked importance. This society in 1887 absorbed the Royal Agricultural Society, founded in 1841. A British Board of Agriculture was established in 1889. It has four departments: (1) veterinary; (2) statistical, intelligence and educational; (3) land; (4) ordnance survey. Most of the countries of continental Europe have agricultural societies, although the governments generally exercise a careful supervision over the agricultural interests. Thus, in Germany there is a minister of agriculture as there is in France. The Austro-Hungarian Empire has two ministers of agriculture, one for each of the countries. In the latter country the National Agricultural Society, with government aid, keeps the Hungarian herd book. Parts of Canada—for instance, Ontario—are provided with societies and boards of agriculture. In the United States a number of agricultural societies (q. v.) were formed toward the close of the eighteenth century: one in South Carolina and one in Philadelphia in 1784, one in New York in 1791, and one in Massachusetts in 1792. There have been many associations for the purpose of holding "fairs" for regions differing in size from one town to several States. There have also been numerous societies of those interested in a special branch of agriculture; for instance, dairying, fruit-growing, stock-breeding, the breeding of merino sheep, etc. During the past twenty-five years the older States have in some form made efforts to collect and disseminate agricultural information. A general form has been a board of agriculture, with a salaried official called a secretary. As a rule each state now publishes an annual report. An additional value has been given to these reports since the establishment of the agricultural experiment stations (q. v.) in connection with the land grant colleges. The large number of the publications of the United States Department of Agriculture (q. v.) now represents the work of a body of trained specialists. See CULTIVATED PLANTS, DOMESTIC ANIMALS, DRAINAGE, VEGETABLE CHEMISTRY, MANURE, ROTATION OF CROPS, SOILS.

Among the great number of works on agriculture, reference may be made to the following: Loudon's, Morton's and the American *Encyclopædia of Agriculture*; Rogers' *History of Agriculture and Prices in England*; Prothero's *Pioneers and Progress of English Farming*; Flint's *American Farmer*; Harris and Griffith on *Manures*; Storer on *Agriculture in its Relations to Chemistry*; Johnson's *How Crops Grow*; French, Waring and Miles on *Drainage*; Miles on *Stock-breeding*; Gurler, Robertson and Grotenfelt on *Dairying*; Stewart on *Feeding Animals*; Weed's *Insects and Insecticides*; Fuller and Roe on *Small Fruits*; Thomas on *Fruit Culture*; Henderson on *Garden*; Gregory on *Squashes*, etc.; Bailey on *Horticulture*.

AGRICULTURE, DEPARTMENT OF, was established in 1862, though the first distribution of seeds, etc., was made by the Commissioner of Patents in 1836. The first garden was established in 1858. The object of the department is to acquire and disseminate among the people of the United States the latest and best information on the subject, and to introduce into the country new and desirable seeds, plants, etc. The divisions of the department are seeds, propagating garden, pomology, ornithology, forestry, and library. Monthly reports of the state of the crops and kindred subjects are issued. The department has a fine building at Washington, with museum, chemical laboratory, etc. In 1888 the department was made an executive department, the head of which is a member of the cabinet. The first one to occupy this position was Norman J. Colman, of Missouri.

AGRIGENTUM (Gr. *Akragas*), the modern Girgenti, a t. on the s. coast of Sicily, in lat. 37° 17' n., and long. 13° 28' e., founded by a colony from Gela (582 B. C.), and, in the earlier ages, one of the most important places in the island. In its palmy days, it is said to have contained 200,000 inhabitants. After being at first free, and then subject to tyrants, it was demolished by the Carthaginians (405 B. C.), but very soon rose again. In the course of the Punic wars, it was compelled to submit to the Romans. From 825 to 1086 A. D. it was in the possession of the Saracens, from whom it was conquered by count Roger Guiscard. The modern Girgenti has about 18,800 inhabitants, is the capital of the province of the same name, and exhibits numerous and splendid ruins, which afford inexhaustible materials for pictorial representation.

AGRIMONY (*Agrimonia*), a genus of plants of the natural order *rosaceæ* (q. v.), sub-order *potentilleæ*. The calyx is five-cleft, without bracts; the hardened tube at length invests two carpels, and is covered with hooked bristles.—The COMMON AGRIMONY (*A. eupatoria*) is a native of Britain and other parts of Europe, growing in borders of fields, on waysides, etc. It has an upright habit, attains a height of 2 ft. or more, and has interruptedly pinnate leaves, with the leaflets serrate and downy beneath. The flowers are small and yellow, in close racemes. The whole plant has a pleasant, slightly aro-

matic smell, and is bitter and styptic. A decoction of it is used as a gargle; the dried leaves form a kind of herb tea; and the root has some celebrity as a vermifuge.—Very similar to this is *A. suaveolens*, a native of Virginia, Carolina, etc. It has a very agreeable fragrance.

AGRIONIA, Bœotian festivals in honor of Dionysus, in which women pretended for some time to search for the god, but suddenly desisted, saying that he hid himself among the muses. The tradition is that the daughters of Minyas having despised the rites of the god, were seized with frenzy and ate the flesh of one of their children; and that the A. were celebrated in expiation of the offense.

AGRIPPA, CORNELIUS HENRY, a remarkable character of the 16th c., distinguished as writer, philosopher and physician, who united great ability and extensive acquirements with quackery, was born of a noble family at Cologne, 1486. He led an adventurous and unsettled life, quite in the spirit of his times. As early as 1509, he was appointed teacher of theology at Dôle, in Franche Comté, and attracted great attention by his lectures; but having by his bitter satires on the monks drawn upon himself the hatred of that body, he was accused of heresy, and obliged to leave Dôle. He next taught theology for some time in Cologne, occupying himself at the same time with alchemy, and then went to Italy, where he took military service under Maximilian I., and was knighted. He was afterwards made doctor of laws and of medicine, and gave lectures at Pavia, until, burdened with debt, he fled to Casale. After a time he was appointed syndic of Metz; but in 1520 he was again in Cologne, having excited the hostility of the inquisition and of the monks by his defense of a witch. His old enemies, the monks, persecuted him still in Cologne, so that he went to Freiburg in Switzerland, where he began to practice as a physician. In 1524, he went again to Lyons, and there he gained such a reputation that the mother of Francis I. chose him as her physician. As he declined to prophesy the issue of the campaign that Francis I. undertook in 1525 in Italy, he lost his post and went to Holland. Here he wrote his celebrated book, *De Incertitudine et Vanitate Scientiarum* (Cologne, 1530), a biting satire on the sciences as they then existed. An accusation against him having been brought before Charles V., on account of this book, he again became a fugitive, and repaired to Lyons. He there found the hatred he had early excited in France not yet extinguished, and was imprisoned; but being liberated, through the exertions of his friends, he retired to Grenoble, where he d. (1535). A. was a clear-headed man, and had the merit of successfully combating many of the prejudices of his age. His book, *De Occulta Philosophia*, containing a systematic account of the cabbala (q.v.), directly contradicts the above work. A complete collection of his writings appeared at Lyon, 2 vols., without date (about 1550). See Life of A., and analysis of his works, by H. Morley (1856).

AGRIPPA, HEROD, I., son of Aristobulus and Berenice, and grandson of Herod the great, was educated at Rome. He lived there in a very extravagant style, giving splendid entertainments, especially to the princes of the imperial family, and scattering his money lavishly in gifts to the freedmen of the emperor, until his debts rendered it unsafe for him to remain longer in the city. He then took refuge in Idumea. From this period almost to the death of Tiberius, he suffered a variety of misfortunes, but having formed a friendship with Caligula, the latter, on his accession to the throne, gave him the tetrarchies of Abilene, Batanæa, Trachonitis and Auranitis. After the banishment of Herod Antipas, he received his tetrarchy also—namely, Galilee and Perea. Claudius, whom A. helped to secure the possession of the empire, added to his dominions Judæa and Samaria, and he was thus the ruler of a more extensive territory than even Herod the great had been. His government was mild towards the Jews, with whom he was remarkably popular; but he severely persecuted the Christians. He caused James, the brother of John, and the head of the church at Jerusalem, to be beheaded, and Peter to be thrown into prison. He d. of a peculiarly loathsome disease at Cæsarea, in Palestine, while celebrating games in honor of the emperor, in the 55th year of his age, and the 44th of the Christian era. The account given of this in the Acts of the Apostles substantially agrees with that of Josephus.

AGRIPPA, HEROD, II., son of Agrippa I., was at Rome when his father died, and only 17 years of age. Claudius, therefore, resolved to detain him for some time, and in the meanwhile retransformed the kingdom into a Roman province, but presented him with the little territory of Chalcis when his uncle Herod, who was its ruler, died. In 53 A.D., he left Rome, and received from the emperor nearly the whole of his paternal possessions, which were subsequently enlarged by Nero. Like his father, A. was fond of fine buildings, a taste which he probably acquired by his long sojourn at Rome. He spent great sums in adorning Jerusalem, Berytus, and other cities; but he was not prudent in the distribution of his favors, or just in his treatment of the high-priests, so that he failed to secure the good-will of the Jews. He did all in his power, however, to dissuade them from rebelling against the Romans; but when he found his advices and warnings neglected, he abandoned his countrymen, and joined the imperial troops. When Jerusalem was taken, he went with his sister to live at Rome, where he was made prætor, and where he died in the 70th year of his age—the last of the Herods. It was before ~~him~~ Paul made his memorable defense.

AGRIPPA, MARCUS VIPSANIUS (63–12 B.C.), a Roman, who, though not of high birth, rose to an exalted position through his own talents. He first espoused Marcella, the niece, and then Julia, the daughter of Octavius. He was eminent both in war and in peace; and as a general, counselor and friend of the emperor, did good service to him and to the Roman state. As a general, he laid the foundation for the sole dominion of Octavius, and commanded his fleet in the battle of Actium (31 B.C.). He was generous, upright, and a friend to the arts; Rome owed to him the restoration and construction of several aqueducts, and of the Pantheon, besides other public works of ornament and utility.

AGRIPPINA.—I. The daughter of M. Vipsanius Agrippa, by his wife Julia, was one of the most heroic and virtuous women of antiquity. She was married to Cæsar Germanicus (see GERMANICUS), whom she accompanied in all his campaigns. She openly accused Tiberius before the senate of having hired the murderers of her husband; and the tyrant, who hated her for her virtues and the esteem in which she was held by the people, banished her to the island of Pandataria, near Naples, where she voluntarily died of hunger (33 A.D.). The antiquarian museum at Dresden possesses four excellent busts of her.—II. A very different character was AGRIPPINA, the daughter of the last mentioned, one of the most detestable women that have lived. In her second widowhood, she induced the emperor Claudius, her own uncle, to marry her, and espoused his daughter, though already betrothed to another, to her son Nero. In order to bring the latter to the throne, she ruined many rich and noble Romans, excluded Britannicus, the son of Claudius by Messalina, and finally poisoned the emperor, her husband. She then endeavored to govern the empire through her son Nero, who was chosen emperor; but her ascendancy proving intolerable, Nero caused her to be put to death (60 A.D.). She enlarged and adorned her native city, Cologne, which received from her the name of Colonia Agrippina.

AGTELEK, Cavern of (in Hungarian, *Baradla*, i.e., a suffocating place), one of the largest and most remarkable stalactitic caverns of Europe, is situated near the village of Agtelek, in the co. of Gomor, not far from the road from Pesth to Kaschau. It opens at the foot of a mountain with an entrance scarcely $3\frac{1}{2}$ ft. high by 5 ft. wide. It consists of a labyrinth of caverns communicating with one another, many of which it is difficult, and even dangerous, to explore, when the streams that flow through them are high. Numerous stalactitic structures occur in all the caverns, which, from their singular shape, have given rise to the various names of "the Great Church," "the Mosaic Altar," "the Image of the Virgin," etc. The largest and most imposing of these caverns, situated about 200 paces from the entrance, is called the *Flower-Garden*. It is 96 ft. high, 90 ft. wide, and runs nearly 900 ft. in a straight line.

AGUA, VOLCAN DE, a conical volcanic mountain, 18 m. s.w. of Guatemala, 15,000 ft. above sea-level. Its crater is about 450 ft. by 350 ft. It ejects stones and hot water. Near by are the volcanoes of Pacaya and Fuego, and the three often present a magnificent spectacle. Agua has twice destroyed the old town of Guatemala.

AGUADO, ALEXANDER MARIA, Marquis de Las Marismas del Guadalquivir, one of the wealthiest bankers of modern times, was b. at Seville, 1784, and d. 14th April, 1842. He was descended from a Jewish family, and in his youth bore arms as a soldier. During the Spanish war of independence, he fought with distinction on the side of Joseph, rose in the French army to the rank of colonel, and acted as aide-de-camp to marshal Soult, but retired in 1815, and began a commission business at Paris. In this he soon realized such wealth as enabled him to found a bank. Good-fortune, energy and boldness, with a singular talent for concerting schemes, advanced him in a short time to be one of the first bankers in Paris. He also obtained a political reputation by negotiating the Spanish loans of 1823, 1828, 1830 and 1831. In these operations, the Spanish government frequently invested him with unlimited powers, which he dexterously employed to save his country from national bankruptcy. Ferdinand VII. conferred on him the title of Marquis de Las Marismas del Guadalquivir. His services were also recompensed by privileges in mining and in executing public undertakings. All the Spanish bonds issuing from his house received the name of *Aguados*. It was through A. that the Greek loan of 1834 was effected. He was naturalized in France in 1828, and at his death left a fortune of above 60 million francs, of which he had invested part in landed property; the castle of Château-Margaux, celebrated for its wine, belonged to him. His distinguished collection of pictures gave occasion to Gavard for the publication of the *Galerie A.* (Paris, 1837–1842).

A'GUAS CALIENTES, a t. in Mexico, cap. of the state of Aguas Calientes. It is situated in n. lat. $21^{\circ} 53'$, and w. long. $101^{\circ} 45'$, in a plain 6000 ft. above the sea-level, and on a stream of the same name, which is tributary to the Rio Grande de Santiago. It contains a pop. of 32,400; and besides the cultivation of fields and gardens, the manufacture of woolen cloth is very considerable, and is carried on by the factory system. The t. is on the Mexican Central r.r., and the highway from Mexico to Sonora and Durango is here crossed by that from San Luis Potosi to Guadalajara. The environs abound in hot springs, from which the t. takes its name. Pop. of state of A. C., 1893, 140,000.

A'GUE (*febris intermittens*) is the common name for an intermitting fever, accompanied by paroxysms or fits. Each fit is composed of three stages, the cold, the hot and the sweating stage. Before a fit, the patient has a sensation of debility and distress about the epigastrium; feels weak and disinclined for exertion; the surface of his body becomes cold, and the bloodless skin shrivels up into the condition termed goose-skin (*cutis anserina*). A cold sensation creeps up the back, and spreads over the body; the patient shivers, his teeth chatter, his knees knock together; his face, lips, ears and nails turn blue; he has pains in his head, back and loins. This condition is succeeded by flushes of heat, the coldness gives place to warmth, and the surface regains its natural appearance. The warmth continues to increase, the face becomes red and turgid, the head aches, the breathing is deep and oppressed, the pulse full and strong. The third stage now comes on; the skin becomes soft and moist, the pulse resumes its natural force and frequency, and a copious sweat breaks from the whole body.

These paroxysms recur at regular intervals. The interval between them is called "an intermission." When they occur every day, the patient has *quotidian* A.; every second day, *tertian*; and when they are absent for two days, *quartan*. All ages are liable to this disease; and a case is on record of a pregnant woman having a tertian A. which attacked her of course every other day; but on the alternate days, when she was well, she felt that the child also had A., although the paroxysms did not coincide with her own.

The exciting causes of this disease are invisible effluvia from the surface of the earth (marsh miasmata). A certain degree of temperature seems necessary—higher than 60° Fahrenheit—for the production of the poison. It does not exist within the arctic circle, nor does it appear in the cold seasons of temperate climates, and seldom beyond the 56° of n. lat. (Watson). It also requires moisture. In England A. is almost exclusively confined to the eastern coast; and the extension of drainage has rendered A. far more rare than before. James I. and Oliver Cromwell died of A. contracted in London. The Pontine marshes to the s. of Rome have long been notorious as a source of aguish fevers. Peat bog or moss is not productive of malaria, as is seen in parts of Ireland and Scotland. Neither is A. ever seen among the inhabitants of the Dismal Swamp—a moist tract of 150,000 acres on the frontiers of Virginia and North Carolina in North America. The treatment of aguish fever consists generally in calomel given in purgative doses, followed by preparations of cinchona-bark, and in applying, during the paroxysm, external warmth to the body. See **MALARIA**.

AGUESSEAU, HENRI FRANÇOIS D', a distinguished lawyer and chancellor of France, and pronounced by Voltaire to have been the most learned magistrate that France ever possessed, was born at Limoges, 1668 A.D. He received his earliest education from his father, and afterwards devoted himself to the study of law; became *avocat-général* at Paris in 1690, and at the age of 32, *procureur-général* of the parliament. In this office he effected many improvements in the laws and in the administration of justice. He displayed great benevolence during a famine which occurred in the winter of 1709, applying all the means in his power for the alleviation of the calamity. As a steady defender of the rights of the people and of the Gallican church, he successfully opposed the decrees of Louis XIV. and the chancellor Voisin in favor of the papal bull *Unigenitus* (q.v.). During the government of the duke of Orleans he became chancellor, but in the following year fell into disgrace by opposing Law's system of finance, and retired to his country-seat at Fresnes. When, however, the ruin induced by Law's system produced a general outcry of dissatisfaction, A. was reinstated, in order to appease the people. But his well-meant efforts could not retrieve the desperate state of affairs. A. was afterwards exiled a second time, in consequence of his opposing cardinal Dubois; and though he (in 1727) obtained from cardinal Fleury permission to return, yet he did not again resume the office of chancellor till 1737. He resigned in 1750, and d. Feb. 9, 1751. His works, consisting of pleadings and speeches at the openings of the parliament, occupy 13 volumes (Paris, 1759-89; Paris, 1819).

AGUILAR, GRACE, 1816-47; an English authoress of Hebrew parentage, and a writer chiefly of religious fiction, such as *The Martyr* and *Home Influence*. She wrote in defense of her faith *The Spirit of Judaism*, and other works. The "Women of Israel" gave her a testimonial shortly before her death.

AGUILAR DE LA FRONTERA, a t. of Andalusia, Spain, in the province of Cordova, occupying the summits and slopes of several low hills on the left bank of the Cabra, 26 m. s.e. from Cordova. Many of the houses are of three stories, and the t. is remarkable for the whiteness of its houses and the cleanness of its streets. It has three fine squares, and a dismantled Moorish castle. The chief trade is in corn and wine. Many of the inhabitants are employed in agriculture, and in the breeding of oxen, horses and mules. Pop. 12,500.

AGUIRRE, or **AGUIRRA**, JOSÉ SAENZ DE, 1630-99; a Spanish ecclesiastic and author, of the Benedictine order; abbot of St. Vincent, professor of theology in the university of Salamanca, and secretary to the Spanish inquisition. He was made cardinal about 1686, in reward for a work in which he supported the papal authority against the four articles of the Gallican church. He wrote a *Collection of the Councils of Spain*, and left unfinished a *Treatise on the Theology of Anselm*.

AGUIR'RE, LOPE DE, about 1508-61, a Spaniard noted for his crimes. He went to Peru with Ursua in search of the mythical El Dorado; induced Ursua to assume kingly authority, and then killed him to seize the power, afterwards killing many who displeased him. He was finally deserted, and captured and executed by the Spanish authorities of Venezuela.

AGUL'HAS, CAPE (meaning needles), the most southern point of Africa, lies about 100 m. e.s.e. of the cape of Good Hope, in lat. 34° 51' s., long. 19° 55' e. In 1849, a lighthouse was erected on it, at an elevation of 52 ft. above high-water. The A. bank extends along the whole southern coast of Africa. It is 560 m. in length, and, opposite the cape of Good Hope, as many as 200 in breadth.

AGUR', a t. of India, in the territory of Gwalior, the possessions of Scindia's family, on the route from Oojein to Kota, 41 m. n.e. from Kota. It stands in an open plain, 1598 ft. above the sea, is surrounded by a rampart of stone, and has on one side of it a large and fine tank.

AGUSTI'NA, the "maid of Saragossa," d. June, 1857, at a great age. In youth she was a peddler of cool drinks to soldiers. During the siege of Saragossa by the French, in 1809, she distinguished herself by heroic participation in several severe encounters, once snatching the fuse from a falling cannonier and firing the gun at the enemy, from which act she got the name "La Artillera." She was made sub-lieut. in the Spanish army, and presented with many decorations. Byron immortalized her in *Childe Harold*.

AGYNIA'NI, or AGYNIANS, a Christian sect at the end of the 7th c., who condemned marriage, and declared a true Christian life to consist of the renunciation and mortification of all physical appetites and passions.

A'HAB, the son and successor of Omri, was king of Israel from 918 to 897 B.C. He married Jezebel, the daughter of Ethbaal, king of Sidon; through whose injurious influence the Phœnician worship of Baal was introduced, the king himself seduced to idolatry, and the priests and prophets of Jehovah cruelly persecuted. Yet the prophets retained their influence over the people; and Elijah dared openly to attack the priests of Baal, and reprove the wickedness of the king with the most severe threatenings of punishment. A. prosecuted three wars, with various success, against Benhadad, king of Syria; but in the last campaign he was killed by an arrow. His whole family was afterwards extirpated under king Jehu.

AHAN'TA, a portion of the gold coast of Africa, rich and fertile. England has stations at Axim and other places ceded by the Dutch in 1872. Prussia undertook to colonize A. in 1683, but in 1718 sold out to the Dutch West India company.

AHASUERUS is the name, or rather, perhaps, the title, by which several kings of Media and Persia are mentioned in scripture. The best known of these is Esther's husband (see **ESTHER**), who is probably the same as the Persian king Xerxes; the Hebrew form of his name (Achaschverosch) pointing to the old Persian form of the name Xerxes (Khschyârschan).

AHAZ, son of Jotham, and 11th king of Judah, reigning 741-725 B.C.; weak-minded and corrupt. In his time Pekah, king of Israel, and Rezin, king of Syria, undertook to capture the kingdom of Judah, and besieged Jerusalem but did not take the city, though they carried away many captives. Incursions were made by the Edomites and Philistines, and Ahaz asked help of Tiglath-Pileser, king of Assyria, who drove out the invaders but took heavy toll from Ahaz, compelling him to appear at Damascus as a vassal, while his kingdom was brought to the lowest point of political degradation. The conduct of Ahaz was that of a heathen; he broke up the sacred vessels, and closed the doors of the temple; he sacrificed to Syrian deities, and caused his son to pass through the fire to Moloch. He was succeeded by his son Hezekiah.

AHAZI'AH, son and successor of Ahab, and 8th king of Israel, reigning less than two years, 897-96 B.C. He followed his father's idolatry, worshipping Baal and Astarte. On his accession the Moabites first revolted, refusing to pay tribute; and before he was ready to go against them he fell from a window of his palace. He sent messengers to his god to know the result of his injuries; but the messengers met Elijah, the prophet of Jehovah, who sent them back with word that the king would surely die.

AHAZIAH, son of Jehoram and Ahab's daughter; 6th king of Judah; reigned one year, 884 B.C. He was idolatrous and wicked, and was slain by Jehu.

AHIM'ELECH, a Jewish high-priest, who, induced by David, supplied the latter's hunger with the shew-bread of the tabernacle, which was forbidden except to the priests; for which Saul caused Doeg to slay A.

AHITH'OPHEL, probably grandfather of Bathsheba, and by her introduced at David's court. He was a wise man in spite of his name (which means "brother of foolishness"), and David's most trusted counselor until his defection in Absalom's case, which caused the king much sorrow. His advice showed the way of success to Absalom's party, but Hushai's counsel for delay prevailed, which A. believed would be fatal to the rebel cause; and he went home, "put his house in order and hanged himself," the only deliberate suicide recorded in the Old Testament.

AHL/FELD, CHARLOTTE SOPHIE LOUISE WILHELMINE VON, 1781-1849, a German novelist. She married A. 1798, and separated from him in 1807. She was praised by Goethe for her precocious literary talent. She published several sentimental novels under the name of "Eliza Selbig," and others under her real name, and wrote a volume of poems.

AHLEFELDT, ELISA DAVIDIA MARGARETA, countess, born in Denmark, 1790, a German woman noted for her patriotism and her love of letters. She was the wife of a German officer, von Lützow, whom she accompanied on his campaign. She distinguished herself by her care of the wounded on the battlefield. She afterward separated from her husband, and lived for a time with the author Immermann.

AHL/FELD, JOHANN FRIEDRICH, born in 1810, a German pulpit orator, for a long time a pastor at Leipsic. Among his published writings are *Erzählungen für das Volk* (1881) and *Ein Kirchenjahr in Predigten* (1883). He died in 1884.

AHL/QUIST, AUGUST ENGELBERT, b. 1826, a Finnish philosopher and poet, professor of Finnish literature at Helsingfors. He was distinguished for ethnographic investigations, especially of the dialects and races of the Uralo-Altaic family. He wrote a grammar of the nearly extinct Wot language. In 1847 he started a Finnish journal, and he has translated some of Schiller's works into Finnish, and written poems. He died in 1889.

AHL/WARDT, THEODOR WILHELM, b. 1828, son of Christian Wilhelm A., the Hellenic philosopher. In 1861, he became professor of oriental languages in Greifswald university. He is an authority on Arabic literature and history.

AHMEDABAD', or more properly AHMADABAD, the chief t. in the district of the same name, in the presidency of Bombay, is situated on the left bank of the Sabarmati, which flows nearly due s. into the gulf of Cambay. It was built in the year 1412, by Ahmed or Ahmad Shah, and underwent all the vicissitudes of government incident to the cities of Hindostan, till the year 1818, when it finally came under the power of the British. It was formerly one of the largest and most magnificent capitals in the east — in the opinion of a native writer, "the handsomest city in Hindostan; perhaps in the world." Its architectural relics are gorgeous, even in the midst of decay. The Jumna or Juma'ah Masjid, or great mosque, rises from the centre of the city, and is adorned by two superbly decorated minarets, "each of which contains a circular flight of steps, leading to a gallery near the summit. Its domes are supported by lofty columns, regularly disposed; the concave of these cupolas is richly ornamented with mosaic and fret-work. The pavement is of the finest marble." The mosque of Sujaat Khan is extremely elegant. There is likewise an ivory mosque, which has obtained that name from the circumstance that, although built of white marble, it is "curiously lined with ivory, and inlaid with a profusion of gems, to imitate natural flowers, bordered by a silver foliage on mother-of-pearl." There are also the Fire Temple and the Tower of Silence of the Parsis. A. once abounded in gardens, aqueducts, reservoirs, etc.; but these, especially the gardens, are now sadly defaced and injured. Its prosperity has been almost wholly destroyed by the rapacity of Mahrattas, although at one time it was famous for its manufacture of rich fabrics of silk and cotton, articles of gold, silver, steel, and enamel. "It employed many artists in portrait-painting and miniatures," and had extensive trade in indigo, cotton and opium. The old city-walls, built in 1485, which had, in the course of ages, and through the assaults of enemies, become very dilapidated, were repaired in 1834 at an expense of 250,000 rupees. Water was also conveyed from the river through the city by means of pipes. It is distant from Bombay 290 m. n.; in lat. 23° n., long. 72° 36'. Pop. '91, including cantonments, 148,400. Area, dist. of A. in Guzerat, 3949 sq. m.; pop. 929,000.

AHMEDNUG/GUR, or AHMADNUGGUR, an important t. in the presidency of Bombay. It was founded in 1494 by Ahmed Nizam Shah. During the reign of his son, Boorhan Nizam Shah, it reached a high degree of prosperity; but after his death it witnessed an incessant series of wars, confusions, and murders. In 1797 it fell into the hands of the Mahrattas; and in 1803 was surrendered, after a trivial resistance of two days, to gen. Wellesley. It was, however, shortly after restored to the Peishwa; but in 1817, the fort was again occupied by the British. The t. has increased rapidly since it came under British protection and rule. Its houses for the most part are built of sunburnt bricks, but it has many specimens of Moslem architecture. Its manufactures are carpets, cotton, silk, brass. An earthen wall surrounds the city, and it is guarded by a fort half a mile distant. It was once a splendid and populous city, but has greatly declined, although many relics of its former magnificence still remain. It also possesses a good supply of water by means of aqueducts. It is distant from Bombay 122 m. e., in lat. 19° 6', long. 74° 46'. There are several places of the same name in Hindostan. Pop., including cantonments, '91, 41,700. Area of dist. of A., 6645 sq. m.; pop. 889,000.

AHMEDPUR', a t. of India, in the native state of Bhawalpur, and 36 m. s. w. from Bhawalpur, a few miles from the left bank of the Indus river. The houses are mostly built of mud; but there is a large and lofty mosque with four tall minarets. It formerly manufactured matchlocks, gunpowder, cotton, and silk. The pop., is estimated at 9800.

AH/MED SHAH, b. about 1724; hereditary chief of the Abdali tribes, and founder of the Durrani dynasty of Afghanistan. While a boy he was a prisoner with a hostile tribe, but in 1738 he was rescued by Nadir Shah, who gave him command of a body of

cavalry. On the assassination of Nadir, in 1747, Ahmed, who had failed to capture a Persian treasure train, retreated to Afghanistan and persuaded the native tribes to make him their sovereign. He was crowned at Candahar, Oct., 1747, changing the name of his tribe to the Durrani. By keeping his armies at work in foreign conquests, and interfering but little in the local affairs of the tribe, he soon consolidated his power; and having acquired the koh-i-noor—the famous diamond—and much captured treasure, he had the advantage of great wealth. In 1748 he took Lahore, and in 1751 became minister of the Punjab, and soon subdued all Kashmir. The great mogul having retaken Lahore, he went against him in 1756, entered Delhi in triumph and gave the city to pillage for a month. He took for one of his wives a princess of the royal family, and gave another to his son Timour, whom he made governor of Punjab. He had scarcely left Delhi when the Mohammedan vizier, whom he had left in office, seized the city, killed the great mogul, and set another of the family, a tool of his own, on the throne. At the same time the Mahratta chiefs took occasion for attempts to establish the Hindoo power, and Ahmed had more than once to cross the Indus on war expeditions. Jan. 6, 1761, he defeated the Mahrattas and Sikhs at the great battle of Parifat, but was compelled to hasten back to quell rebellion at home. The Sikhs rose, and he was finally forced to give up the Punjab. He died in 1773, of cancer in the face, and was succeeded by his son Timour.

AHN, JOHANN FRANZ, 1796–1865; a German grammarian, for many years a teacher in Neuss. He wrote many manuals for teaching German and other languages, and published in English a collection of German poetry. His *Practical Method for a Rapid and Easy Acquisition of the French Language* has passed through many editions.

AHRENS, HEINRICH, b. 1808; a German writer on law, philosophy, and psychology, who studied at Gottingen. He was concerned in the political troubles in 1831, lectured in Paris, and from 1834 was 14 years professor of philosophy at Brussels. He was a member of the Frankfort parliament of 1848, and on the committee to draft a new German constitution. For a few years afterwards he held a professor's chair at Gratz, and for twenty years following represented the Leipzig university in the first Saxon chamber. Among his works are a *Course of Psychology*; *Philosophy of Law, or Natural Rights on a Philosophico-Anthropological Basis*, and a cyclopædia of law. The two last-named works have been republished in several languages. He died in 1874.

AHRIMAN (in the Zend, *añhro mainyus*, i. e., the malignant, destroying spirit) is, according to the dualistic doctrine of Zoroaster, the personification of malignity, the original source of all moral and physical evil, the chief of the devils and malignant spirits, the king of darkness and of death, and consequently the eternal enemy and opponent of Ormuzd and of his kingdom of light. See ZOROASTER, PERSIA, AVESTA.

A-HULL, maritime term, used to denote the position of a ship when all her sails are furled and her helm lashed on the lee-side: in such a position she lies nearly with her side to the wind, but with the head turned a little toward the direction of the wind.

AI' a royal city of the Canaanites, 12 m. n. of Jerusalem. It existed in the time of Abraham, but is chiefly noted for its destruction by Joshua, who made it "a heap forever, even a desolation." A city which seems to have occupied the site is supposed to have been mentioned in Isaiah, and also after the captivity. Its ruins were said to exist in the time of Eusebius and Jerome, though none are now to be found.

AIDAN, SAINT, bishop of Lindisfarne, one of those distinguished monks of the early Scoto-Irish Church, who were received into the calendar of saints without the ceremony of canonization. His period is the middle of the 7th c. He was the first efficient missionary who propagated Christianity in the n. of England. Oswald, the celebrated king of Northumbria, requested the community of Iona to send to his court one of their brethren who would teach the Christian religion to his people. As the history has come down to us, the first person sent was a certain Cormac, who was too dogmatic and intolerant to be a successful missionary. On his returning after a failure, A., who possessed the patience, geniality and popular manners fitted for the task, was successful. He left a great reputation as the earliest promulgator of Christianity in the northern districts. His biography has been written by A. C. Fryer (1884).

ÃIDÉ, HAMILTON, English poet and novelist, b. Paris, 1830, was the son of an Armenian and of a daughter of Admiral Sir George Collier. He served seven years in the British army, and then, settling down in the New Forest, devoted himself to literature. Among his poems are *Elcanore* (1856), and *Songs without Music* (1882); among his novels, *Rita* (1859); *Passages in the Life of a Lady* (1887) and *Elizabeth's Pretenders* (1895).

AIDE-DE-CAMP, an officer who may be regarded as a kind of superior confidential attendant upon a general in active service. The A. is the organ of the general. He carries all orders on the field of battle: these he is to deliver in the plainest terms, so as to be distinctly understood; and when so understood, the orders are to be as implicitly obeyed as if the general himself were present and speaking. As an example of the importance of this matter, may be adduced the brilliant but disastrous light-cavalry charge at Balaklava in the autumn of 1854. Lord Raglan sent a message, partly verbal and partly writ-

ten, to the earl of Lucan, concerning a particular piece of strategy at a certain time and place; the message was misconceived, and the earl of Cardigan was directed to make a military movement, perfectly hopeless in its character, resulting in a very serious cavalry loss; although the incident presented a fine display of heroism united with discipline. An A. also acts as secretary to the general, and assists him in his correspondence, when he has not specifically a military secretary. He aids likewise in dispensing the courtesies of the general's house or tent. Generals are much accustomed to appoint their sons or other relations to this confidential post. The A. vary from one to four in number, according as the commander is a brigadier-general, major-general, lieutenant-general, general, or field-marshal: each receives 9s. 6d. a day besides regimental pay. Before an officer can be appointed as A., he must have been two years with his regiment, and must pass an examination. A. are not removed from the list of their regiments; and, most commonly, are captains. Besides these A. to generals, the queen has the power to appoint any number of A. to herself, in her capacity of nominal head of the army. There are no particular duties attached to the office; but it is much sought after, both as an honor, and as conferring on the holder the rank of colonel in the army. There are 6 who receive daily pay as A., and who take it in turn to attend the queen on state occasions. In the year 1876, there were no fewer than 33 military A. to the queen, of whom 8 were peers of the realm; but of the 33, only 19 belonged to the army; the rest, except two of the marines, being militia officers, whose appointments are purely honorary. In addition to all the above, there are naval A. to the queen, of whom there were 11 in the year 1876.

An officer in the United States Army of the rank of major-general is allowed three A. D. C's, who can be either captains or lieutenants; a brigadier general has two lieutenants as his A. D. C's. When the office of general existed in the service, the officer of that rank was allowed six A. D. C's with the rank of colonel. A lieutenant-general was allowed two A. D. C's (lieutenant-colonels) and a military secretary. The officer holding the position is in the most confidential relations with the general. He carries all orders on the field of battle, these he is to deliver in the plainest terms, so as to be distinctly understood, and when so understood, the orders are to be as implicitly obeyed as if the general himself were present and speaking. The aide also acts as secretary to the general, and assists him in his correspondence when he has not specifically a military secretary.

AIDE-TOI ET LE CIEL T'AIDERA (help yourself, and heaven will help you). This moral aphorism was the cry of certain French political writers to the middle classes, about the year 1824, and became the watch-word and title of a society, having for its object to agitate the electoral body in opposition to the government. This, however, was to be done by means strictly legitimate, and chiefly by correspondence and political publications. Most of its founders and active members belonged to the party of *Doctrinaires* (q.v.), as Guizot, who was president for some time, Duchatel, Duvergier de Hauranne, Dubois, Remusat, Thiers, Cavaignac, etc. *Le Globe* newspaper was the organ of the association, and afterwards *Le National*. It had a great share in bringing about the revolution of July 1830, and was at first countenanced by the new government; but after a short time it was dissolved (1832).

AIDIN', or GUZEL-HISSAR, a t. of Asiatic Turkey, on the river Meander, in the pashalic of Anatolia, built out of the ruins of the ancient Tralles, which was situated on a plateau above the present t. It lies sixty m. s. e. of Smyrna, contains a population estimated at 36,300 inhabitants, is 4 m. in circuit, and carries on a trade next in importance to that of Smyrna. It is adorned, like all eastern cities, with numerous mosques and other religious edifices, and has a picturesque appearance.

AIDONÉ, a t. of Sicily, in the province of Caltanissetta, 20 m. e. by s. from Caltanissetta. It crowns the summit of a lofty height commanding a view of the great plain of Catania. It was one of the settlements of the Lombards, who accompanied Roger the Norman in his conquest of Sicily. The road which leads to the t. is very rugged, bordered by luxuriant prickly-pears. Pop. about 7000.

AIDS. These were originally mere benevolences granted by a tenant to his lord, in times of distress; but gradually they came to be regarded as matters of right, and not of discretion. There were three principal objects for which A. were demanded: 1st, to ransom the person of the lord when taken prisoner; 2d, to make his eldest son a knight; and 3d, to provide a suitable portion to his eldest daughter on her marriage.

AIGRETTE, a French word, used to denote the down or plume (botanically, *pappus*) which is found attached to many vegetable seeds, as the thistle and dandelion. It is also used in reference to the feathery tuft on the heads of several birds, as the heron; and in English zoology the name aigret or egret (q.v.) is applied to the lesser white heron, an elegant bird, with a white body and a feathery crest. Hence the term A. came to be used to designate the long, delicate white feathers which, being stuck upright in a lady's head-dress, are calculated to give a majestic appearance to the person. More recently, the usage has been still further extended, and any head-dress bearing an analogy to a plume, even a bouquet of flowers, fastened with precious stones, is denominated an A.

AIGUEBELLE, PAUL ALEXANDRE NEVEUE D', b. 1831; a French naval officer. He entered the service in 1846; was licut. in 1858, and went into the Chinese service, where

he distinguished himself against the Taepings in 1862-64. He became chief commander of the Franco-Chinese corps, forced the insurgents to flee from several towns, and captured Hong Chow. He was made a mandarin of the first class in China, and an officer of the legion of honor in France. With M. Gicquel he established the arsenal at Foo-chow-foo, and taught the Chinese to construct European vessels, the first Chinese man-of-war being launched under his supervision in 1869, when he was made grand admiral of the Chinese fleet. He d. 1875.

AIGUES-MORTES (*Aquæ Mortuæ*), a small t. in France—pop. about 4000—in the department of Gard, which claims to have been founded by the Roman Marius. It is situated in an extensive marsh, impregnated with sea-salt, and is about 3 m. from the Mediterranean, with which it is connected by a canal. It was from A. M. that St. Louis sailed in 1248, and again in 1270, for the crusades—a proof that the sea then reached this spot. In 1538, Francis I. had an interview at A. M. with Charles V.

AIGUILLE (Fr., a needle), an instrument often used by military engineers, to pierce a rock for the reception of gunpowder, when any blasting or blowing-up is to be effected.

AIGUILLETTE, a part of the decorations of military dress. It was formerly worn on the right shoulder by general officers of various grades; but is now chiefly confined to officers of the life-guards and horse-guards. It is merely an ornament, composed of gold or silver cords and loops.

AIGUILLON, ARMAND VIGNEROT DUPLESSIS RICHELIEU, Duc d', 1720-82; minister of foreign affairs under Louis XV., governor of Brittany in 1758. He was replaced as minister by Vergennes, and retired to private life. It is supposed that he owed his place at court to the king's mistress, Mme. Dubarry.

AIGULET, a rope called a lashing-rope, employed in ships-of-war for securing the breeching of a gun.

AIKEN, a co. in S. C., formed in 1871; 1068 sq. m. on the e. side of Savannah river, pop. '90, 31,822. There are mineral products, and agriculture and manufactures of cotton, paper, and pottery are the chief occupations. Co. seat, Aiken.

AIKEN, t. and co. seat of Aiken co., S. C.; on the Carolina, Cumberland Gap, and Chicago, and the South Carolina and Georgia railroads; 17 miles east of Augusta. It is in a farming and lumbering region, has an elevation of 600 ft. above sea-level, and is a noted winter resort for consumptives. It has churches, banking facilities, daily and weekly newspapers, Aiken Institute, Schofield Normal and Industrial School for negroes, and numerous hotels. Pop. '90, 2362.

AIKEN, CHARLES AUGUSTUS, D. D., a native of Vt., 1827-92; graduated at Dartmouth, 1846, and in theology at Andover in 1853. He was pastor of a Congregational church in Yarmouth, Me., 1854-59; Latin professor at Dartmouth in 1859-66; at Princeton in 1866-69; president of Union college, 1869-71; and later, professor of Christian ethics in Princeton theological seminary; from 1882 professor of oriental and Old Testament literature. He was editor of *The Book of Proverbs* in Lange's commentary (Amer. ed.), author of many articles in religious periodicals, and was a member of the Old Testament revision committee.

AIKIN, ARTHUR, 1773-1854; son of Dr. John A. He published *Journal of a Tour through North Wales and Shropshire*, edited the *Annual Review*, 1803-3, and with his brother Charles published a *Dictionary of Chemistry and Mineralogy*. Subsequently he prepared a manual of mineralogy. He was one of the founders of the geological society, and a fellow of the Linnæan society.

AIKIN, JOHN, 1747-1822; an English author and editor. He studied medicine and surgery under the celebrated Dr. Wm. Hunter, but tried practice in various places without success, and turned his attention to literary pursuits, in which he was assisted by his sister, Mrs. Barbauld, with whom he published a series of volumes entitled *Evenings at Home*, an instructive and entertaining miscellany for the young. He wrote also *The Natural History of the Year*, a valuable biographical dictionary, and other books; edited the *Monthly Magazine* from 1796 to 1807, and started the *Athenæum*, which soon stopped.

AIKIN, LUCY, 1781-1864; daughter of John A.; an historical writer who greatly assisted her father. She wrote books for the young, such as *Adventures of Rolando and Lorimer*; also published a poem under the title of *Epistles on Women*. Her most important work is *Memoirs of the Court of Elizabeth*, which went through several editions. One of her latest works was *Life of Addison*. She was one of the most accomplished and attractive women of her time.

AIKMAN, WILLIAM, 1682-1731; a Scottish painter who traveled in Italy and Turkey, practiced his art in Edinburgh and London, and was intimate with artists and literary men.

AILANTHUS or **AILANTO** (*ailanthus glandulosus*), a lofty tree, of the natural order *simarubaceæ* (see *XANTHOXYLUM*), a native of China, but now frequently planted to shade public walks in the s. of Europe, in England, and in North America. The styles are combined at the base, the fruit consists of 3 to 5 *samaræ* (or winged *achenia* q.v.). The flowers of the male plant have a disgusting odor. The leaves resemble those of the ash. The tree flourishes on chalky soils, and is hardy enough to endure the climate even of the n. of Scotland. It is easily propagated by suckers and cuttings of the roots. The wood is fine grained, satiny, and suited for cabinet-making.

AILANTHUS SILKWORM, *Samia cynthia* found on the leaves of the ailanthus, on which it feeds. Its silk is much used in China, and some think that it may supersede the true silk, the worm being hardier and less subject to disease, and feeding on a tree grown in all temperate climates. The eggs are treated like those of the regular silkworm; the larvæ, after feeding through the first moult, being placed on the trees and left to themselves.

AILETTES (Fr., little wings) were appendages to the armor worn by knights in the 13th c. They were sometimes made of leather, covered with a kind of cloth called *carida*, and fastened with silk laces. The form was sometimes circular, sometimes pentagonal, cruciform, or lozenge shaped, but more usually square. Sometimes they were not larger than the palm of the hand; in other instances as large as a shield. In most instances, the A. were worn behind or at the side of the shoulders. Whether the purpose of these appendages was as a defense to the shoulders in war; as an ensign or mark, to indicate to the followers of the knight his place in the field; or as armorial bearings, is not now clearly known; but the first supposition is the most probable. A. are figured on many effigies, monumental brasses, and stained windows, in our cathedrals and old churches.

AILLY, PIERRE D', or PETRUS DE ALLIACO, 1350-1420; a French theologian called the "hammer of heretics" and "eagle of doctors;" leader of the Nominalists, and early a doctor of the Sorbonne; Grand Master of the College of Navarre in 1384, and in 1389, chancellor of the university; bishop of Cambray in 1398; confessor and almoner to Charles VI. He induced the calling of the council of Pisa, of which he was an active member. He was made cardinal by John XXIII., and sent legate to Germany, where he was prominent in the council of Constance, 1414-18, furthering the condemnation of Huss and Jerome of Prague, but strenuously advocating reform in the church; maintaining the authority of councils over that of popes, and aiding in the election of Martin V. in place of three rival popes. He was afterwards papal legate to Avignon until his death. His writings are numerous. Among them is an attempt to harmonize astronomy and theology, the astronomy being that of the age, soon to be overturned by Copernicus and Galileo.

AILRED, EALRED, ETHELREDUS, or ALURED, 1109-66, an English ecclesiastic and historian. He was educated at the Scotch court, entered the Cistercian order, became a monk, was transferred to Rievaulx Abbey, Yorkshire, 1146; became abbot, remaining so till his death. He was the author of many historical and theological works, the former of little value owing to his unlimited credulity. Leland says he saw A.'s tomb at Rievaulx adorned with gold and silver ornaments.

AILSA CRAIG, a remarkable islet about 10 m. from the southern coast of Ayrshire, opposite Girvan, lat. 55° 15' 12" n., long. 5° 7' w. Rising abruptly out of the sea to a height of 1114 ft., it forms a most striking object, even at a considerable distance. It is about 2 m. in circumference, and is accessible only at one point, where the accumulation of débris has formed a rough beach. The rock may be described generally as a mass of trap, assuming in some places a distinct columnar form, with dimensions far exceeding those of the basaltic pillars of Staffa. On the n.w., perpendicular cliffs rise to a height of from 200 to 300 ft.; on the other sides, the Craig descends to the sea with a steep slope, covered with grass and wild flowers, with numerous scattered fragments of rock. Solan geese, in particular, breed in the cliffs in countless numbers. About 200 ft. from the summit are some springs, and on the ledge of a crag on the eastern front, are the remains of an ancient stronghold. In 1831, the late earl of Cassillis, the proprietor of A. C., was raised to the dignity of marquis of A. A lighthouse was built here in 1836.

AILURUS FULGENS. See PANDA.

AIMARD, GUSTAVE, b. 1818, a French novelist. He went to America as cabin-boy, and lived ten years among the Indians; traveled in Spain, Turkey, and the Caucasus, mixing in wars and conspiracies. In 1848 he was in Paris, and an officer of the *garde mobile*. Aimard published his adventures in a long series of novels, *The Trappers of the Arkansas* and *Nights in Mexico*, and is sometimes called the French Fenimore Cooper. During the Franco-German war he organized the francs-tireurs of the press against the Germans. D. 1883.

AIMÉ-MARTIN, LOUIS, 1781-1847; a native of Paris, who in 1815 was appointed editing secretary to the chamber of deputies, and not long afterwards professor of belles-lettres, moral philosophy, and history in the polytechnic school. In 1831, he became keeper of the library of Sainte Genéviève. In 1810 he published *Lettres à Sophie sur la physique, la chimie, et l'histoire naturelle*, in prose and verse; and afterwards the *Life of Bernardin de St. Pierre*, in the literary style of his celebrated subject. But his most valuable work is *Éducation des mères de famille*, showing that the only way to improve mankind is to educate women so that they may be able to raise up men of virtue. His wife, a daughter of the marquis of Belleport, was the widow of Bernardin de St. Pierre, whom she took for her husband in his 63d year, she being 18. She died in the same year with her second husband, bequeathing her fortune to Lamartine, with whom she was a special favorite.

AIMON. See AYMON.

AIN, a river in France, rises in the mountains of the Jura, flows through the departments of Jura and A., and after a course of about 120 m., falls into the Rhone, 18 m. above Lyon.

AIN, a frontier department of France, is bounded on the n. by the departments of Jura and Saône-et-Loire, on the e. it is separated from Switzerland and Savoy by the Rhone, which also divides it from Isère on the s., while on the w. the Saône separates it from the departments of the Rhone and Saône-et-Loire. The eastern part is mountainous; but the southern portion of that part which lies to the w. of the Ain forms an argillaceous plateau, abounding with marshes, which occasion epidemic fevers. This dep. contains five arrondissements. Bourg, Belley, Gex, Nantua, Trévoux. Area, 2230 sq. m. Pop. '96, 351,569. Chief t., Bourg.

AINMÜLLER, MAX. EMAN., to whom we owe the restoration of the art of painting on glass, was born at Munich, 1807. He began the study of architecture, but afterwards entered the royal porcelain manufactory as decorator; and it was here that he first succeeded in overcoming the technical difficulties in the execution of glass-painting. A separate institution was now established for the art; and A., as inspector, succeeded in raising it to a high degree of perfection. He is said to have first conceived the happy thought of laying colored glass on colored, instead of the process hitherto followed, of laying colored glass on white; thus giving the command of above 100 variously colored glasses, in all gradations of tint. He was also the first, in conjunction with Wehrstorfer, to execute pictures on glass, and thus revive the art of miniature glass-painting. Nor was it only technical improvements and inventions that he contributed to the new art; his artistic culture qualified him powerfully to aid the regeneration of taste that has accompanied it. The first work of the new institution was the restoration of the windows of the cathedral of Ratisbon (1826-33), to which A. contributed the ornamentation, and painted several of the figures. He made a like contribution to the splendid windows of the church of Maria-Hilf (1833-38), in Munich. In the contribution of king Ludwig of Bavaria to the cathedral of Cologne, and the numerous other windows executed at Munich for all parts of the world—England among the rest—A. displayed the highest artistic faculty in giving to the figures a rich setting of architectural ornamentation, in such a way as to harmonize with the style of the building.—A. also acquired a great reputation as an architectural painter in oil. Among his pieces are St. Mark's church, in Venice; the interior of St. Stephen's church, Vienna; the interior of Windsor chapel, of Westminster abbey, and the poets' corner. He d. Dec., 1870.

AINOS, a race of men inhabiting Yezo, Saghalien, and the Kurile islands, numbering about 50,000. They are of short stature, thick-set, with bushy black hair, beards, and eyebrows. Though living in Japanese territory, they approach the Caucasian type of humanity, having eyes set at right angles to the nose, and speak in a language having no affinity with the Japanese. They have attracted great attention through the many descriptions of them, often fanciful and exaggerated, by writers who call them the "Hairy Kuriles," and as likely to furnish the long-desired evolutionary link between the hair-clad beast and smooth-skinned man. As matter of fact, their bodies are not, as a rule, more hairy than those of men of the Anglo-Saxon race. The A. are fetish-worshippers, and in disposition are mild and tractable. They have no written language, as closet-scholars and many encyclopædias assert. They are probably the aborigines of Japan. The mikado's government is now civilizing them in schools and on farms, and American missionaries have entered among them. See *The Mikado's Empire*, *Reports of Horace Capron and his Assistants*, Tokio, 1875; *Transactions of the Asiatic Society of Japan*; and *Sunday Magazine*, N. Y., May, 1879, and Batchelor, in *The Ainu of Japan* (1892).

AINSWORTH, HENRY, 1571-1623; an English scholar and divine. Tradition says that he was a Roman Catholic, and his younger brother John a Protestant; that the two entered into a written controversy, reciprocally converted each other, and each embraced the other's religion. Henry was driven from England by proscription and lived in poverty in Amsterdam about 1598. There he became a doctor or teacher in the first church of the sect called Brownists. Though never forward, he was the most steadfast, resolute, and cultured champion of the principles of civil and religious freedom represented by the nonconformists in Great Britain and America. While fighting for freedom from hierarchal tyranny A. pursued his Hebrew studies, and for a long time biographers had two Henry A.'s, one the learned rabbinical student, the other the arch-heretic and leader of the Separatists; but the two were one man. His most notable work is *A Defense of the Holy Scriptures; Worship and Ministry used in the Christian Church separated from Anti-Christ, against the challenges, cavils, and contradictions of M. Smythe*. He wrote notes on all the books of the Pentateuch, the Psalms, and Solomon's Song. There is a story, not probable, that he was poisoned by Jews.

AINSWORTH, ROBERT, the author of a once extensively used Latin dictionary, was b. at Woodvale, near Manchester, in 1660. He was educated at Bolton, and taught a school there for some time, but afterwards went to London, where he was engaged for many years in educational pursuits. In 1714 he commenced his dictionary (Latin-English and English-Latin), which, however, was not published until 1736. A. d. near London on the 4th of April, 1743. He wrote also some Latin poems, and a few

treatises on various subjects; but nothing keeps his memory alive except the dictionary, which itself is now fast passing away into oblivion. The labor expended on such a production was indeed highly honorable to the author, but the work has no claim to the character of an accurate or philosophical lexicon, and, in spite of the numerous emendations it has received, it remains essentially what it was at first, and has been superseded by better works.

AINSWORTH, WILLIAM FRANCIS, an English physician, geologist and traveler, a relation of the foregoing, was b. at Exeter, 1807. He studied medicine at Edinburgh, and, after receiving (1827) his medical diploma, he travelled in France, and prosecuted geological investigations in the Auvergne and Pyrenean mountains. Returning to Edinburgh in 1828, he conducted the publication of the *Journal of Natural and Geographical Science*, and delivered lectures on geology. In 1835, he was attached as physician and geologist to the Euphrates expedition under col. Chesney, at the recommendation of col. Sabine, and returned home in 1837 through Kurdistan, the Taurus and Asia Minor. In the following year he went again to Asia Minor, being sent with Rassam and Russell by the geographical society and the society for the diffusion of Christian knowledge. The objects were chiefly to explore the course of the Halys, and to visit the Christians in Kurdistan. On his return (1841) he published *Researches in Assyria*. He has published also *The Claims of the Christian Aborigines in the East and Travels in the Track of the 10,000*. He has edited *Lares and Penates, or Cilicia and its Governors*; *On an Indo-European Telegraph by the Valley of the Tigris*, a project which the Turkish government has since carried out; *All Round the World*; *The Illustrated Universal Gazetteer*, etc. He is a member of many foreign learned societies, and was one of the founders of the West London Hospital.

AINSWORTH, WILLIAM HARRISON, a well-known writer of fiction, was b. Feb., 1805, at Manchester, where his father was a solicitor. His creative fancy began early to show itself in ballads and tales, which appeared in the local newspapers, and in contributions to the *London Magazine* and other periodicals. Being destined to succeed his father, he entered a writer's office; but after a while he forsook law for literature, and at first began a publishing business in London, which, however, he soon gave up in disappointment. He had previously published his first novel, *Sir John Chiverton* (1826). After spending some time on the continent, he returned to England, and wrote *Rookwood* (1834), which was favorably received. It was followed by *Crichton* (1837) and *Jack Sheppard* (1839). A. edited for a time *Bentley's Miscellany*, and in 1842 began his own *Ainsworth's Magazine*. He published the *Lancashire Witches* in 1848; six years later appeared the *Star Chamber*; in 1860 *Ovingdean Grange*; the *Lord Mayor of London* was published in 1862, *Cardinal Pole* the following year, and *John Law, the Projector*, in 1864. His more recent works are the *Spanish Match*, *Constable de Bourbon*, *Old Court*, *Middleton Pomphrey*, *Hilary St. Ives*, *Merrie England*, and *The Leaguer of Lathom* (1876). He d. 1882.

AIN-TA'B, a t. of Syria, near the source of the Kowek; an affluent of the Euphrates, 59 m. n.n.e. from Aleppo. It is tolerably well built: the houses are mostly of stone. It is well supplied with water, pure streams of which flow constantly through the streets. It has a castle built upon a mound, resting on rock, and of very striking appearance. The chief trade is in hides and leather; but cotton, sheep's and goats' wool, wax, wheat and rice are also of commercial importance, being chief articles of produce in the surrounding district. A. is supposed by some to be the ancient *Antiochia ad Taurum*. Pop. 43,200.

AÏR, or **ASBEN**, a kingdom of c. Africa, extending from about 16° to 20° n. lat., and from 6° to 9° e. long. Agades (q. v.) is the capital, and residence of the sultan, but his power is in a large measure merely nominal. The country has various towns and villages and is within the French sphere of influence. It contains a mountain group ranging in elevation from 4000 to 5000 feet. The surrounding region is generally dry, but on the mountains there is a considerable rainfall. Air includes a large tract of desert. The valleys are naturally rich but they are poorly cultivated. Although in the region of the tropics, the climate is temperate. The inhabitants are principally Tuaregs with an admixture of negro blood. The country is on the caravan route to Sokoto. Its chief products are doom-palm, senna and fruits. Pop. is estimated at 60,000.

AIR is the name given to that compound of gases constituting the substance of our atmosphere. Formerly, all aëriform fluids were called "airs," but in this sense the word *gas* is now used. The chief properties of air, and the phenomena they give rise to, will be found treated under Atmosphere, Aërodynamics, Aërostatics, Air-Pump, Barometer, Balloon, etc.

AIR, in Music. See **ARIA**.

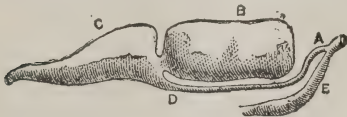
AIRAY, HENRY, D.D., 1560-1616; a Puritan preacher, and provost of Queen's college, Oxford. When first a student he was poor, and did servile work in the college; but he rose in station, took orders, and became a frequent and zealous preacher, a

thorough Calvinist and a fiery opponent of Romanism. In 1606 he was vice-chancellor of the university, and was also rector of Otmoor. He was a good specimen of the more cultured Puritans.

AIR-BEDS and AIR-CUSHIONS. Air-beds were known as early as the beginning of the 18th c., but being made of leather, were expensive. It was only after the invention of air-tight or Macintosh cloth that it became possible to use air in this way at a moderate cost. An air-bed consists of a sack in the form of a mattress, divided into a number of compartments, each air-tight; a projection at one end forms a bolster. Each compartment has a valve, through which the air is blown in by bellows. The advantages of such beds, in point of cleanness, coolness, lightness and elasticity are obvious. They are specially valuable in many cases of sickness. The *travelling-cushion* is another contrivance of the same kind. Recently, vulcanized India-rubber, instead of cloth, has been used in the fabrication of such articles. The chief drawback to these contrivances is the liability to being spoiled by a rent or other injury.

AIR-BLADDER, or SWIMMING-BLADDER, in fishes. An organ apparently intended to aid them in ascending in deep water, and for the accommodation of their specific gravity to various depths. It is made to serve this purpose by the increase or diminution of its volume, according to the degree of pressure exerted upon it by the ribs. Its place is in the abdomen, under the spine; and it is very various in size and form in different kinds of fishes. It generally has an opening into the cesophagus, or into the stomach, but apparently only for the ejection and not for the admission of air. In some fishes it has no opening. The air with which the A. is filled appears to be the result of secretion; and in fresh-water fishes consists in general almost entirely of nitrogen, but contains a larger proportion of oxygen in sea-fishes, the oxygen in deep-sea fishes having been found to amount to 87 per cent.

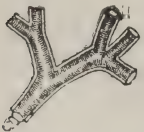
The A. is in some fishes very small; in others, it is entirely wanting, particularly in fishes that are destined to live chiefly at the bottom of the water, as flat fishes, eels, etc.; but there are remarkable instances of its absence also in species of very different habits, such as the common mackerel, whilst it exists in other species of the same genus or family. The A. of fishes affords the finest kind of isinglass.



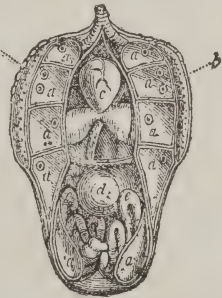
Air-bladder of carp: consisting of two parts—B and C, joined by a narrow neck; A D, a canal communicating with cesophagus, E.

AIR-CELLS, or AIR-SACS, in birds, are remarkable cavities connected with the respiratory system. They are distributed along the inside of the whole cavity of the chest and abdomen; and in birds of strong wing and rapid flight, often send prolongations into the bones. They are connected with the extremely active respiratory system, and communicate with the lungs, giving an immense extension to the surface with which the air inhaled comes in contact.

The cells in the lungs of the mammalia into which the air is conveyed by minute ramifications of the windpipe, in order to be brought into contact with the blood distributed on their walls are very small; in man, only about one hundredth part of an inch in diameter.—Air-cells, or air-sacs, may be said to form the whole respiratory apparatus in some of the lower kinds of animals (see ANNELIDA), whilst in others higher in the scale of organization, particularly in insects, *air-tubes* arising from these ramify throughout the whole body. The air-tubes of insects are



Air-tubes of insect.



Lungs, etc., of ostrich: a a a a, air-cells; b b, lungs; c, heart; d, stomach; e, intestines.

formed of a spiral fiber within a membranous coat, like the spiral vessels of plants, so that they possess great elasticity. See BIRDS, RESPIRATION: GILLS.

AIR-CELLS in plants are cavities containing air in the stems or leaves. The orifices of the intercellular passages are closed up, so as to prevent the juices of the plant from entering them. They are very variable in size, figure, and arrangement, but are formed according to a uniform rule in each particular species in which they are found. They are large and numerous in many aquatic plants, evidently serving the purpose of buoying them up in the water. Besides A. of regular form, there are irregular cavities also called by the same name, which seem to be formed by the tearing of the cellular tissue in the rapid growth of the plant, as in grasses and umbelliferous plants.

AIRD, THOMAS, a poet of considerable genius, b. at Bowden, in Roxburghshire, in 1802. He received the rudiments of education at schools in his native county, from which he passed to the university of Edinburgh. While in the metropolis he made the friendship of many distinguished men, especially prof. John Wilson, who was accustomed to speak of him in the highest terms. In 1835 he became editor of *The Dumfries Herald*, a new journal, started on conservative principles, an office which he filled till

1864. His genius was of a purely literary character, and not calculated to be effective in the discussion of political questions. His works are not so well known as they deserve to be, from their intrinsic merit. In spite of very warm eulogy from some of the greatest names in popular criticism, and in spite of many elaborate and discriminating reviews in various important magazines, they have failed to secure a large measure of public approbation. *The Devil's Dream* is perhaps an exception to the rest, for it is both well known and admired. Competent judges have asserted that there is something almost Dantesque in the stern, intense and sublime literalness of the conception. Whether the scenes are colossal, as in *The Devil's Dream*, or minute, as in *The Summer's Day*, there is the same clear, vigorous and picturesque word-painting. Herein lies A.'s chief originality, for his thought and sentiment, though always pure and fine, are not strikingly novel. In 1827 he published *Religious Characteristics*, a piece of exalted prose-poetry; in 1845, *The Old Bachelor*, a volume of tales and sketches; in 1848, a collected edition of his poems—a second edition of which appeared in 1856; and in 1852 he edited the select poems of David Macbeth Moir (the "Delta" of *Blackwood*), prefixing a memoir for the benefit of Dr. Moir's family. Without having fully realized the expectations to which his early works gave rise, A. died 25th April, 1876. See life and poems edited by J. Wallace (1878).

AIRD'RIE, a flourishing town in Lanarkshire, 11 m. e. of Glasgow. The high-road between Edinburgh and Glasgow intersecting it forms its principal street. It has risen rapidly, and is now one of the most flourishing inland towns in Scotland. Little more than a century ago it consisted of a solitary farmhouse or two, but the abundance of iron and coal in the vicinity has given its progress an impetus like that of an American city (see GARTSHERRIE.) Pop. '91, municipal borough, 19,135.

AIRE, or **AIRE-SUR-L'ADOUR** (anc. *Vicus Julius*), a t. of the dep. of Landes, France, on the left bank of the Adour, 112 m. s. from Bordeaux. It is a bishop's seat; and its cathedral, which has been often destroyed and rebuilt, is one of the most ancient in France. A. has been a place of consequence from the days of the Roman conquest of Gaul, and was the capital of the Visigoths under Alaric, but is now much decayed, and diminishing in population. It has hat manufactories and tanneries. Pop. about 3000.

AIRE, or **AIRE-SUR-LE-LYS**, a town of the department of Pas-de-Calais, France, on the Lys, 30 miles southeast from Calais. The town is fortified and well built, but its situation is low and marshy. There are manufactures of woollen stuffs, linen yarn, thread, hats, starch, Dutch tiles and soap; also some trade in grain. Osier-work is carried on to some extent. Population about 5000.

AIR-ENGINE. See CALORIC ENGINE.

AIR-GUN, an instrument resembling a musket, used to discharge bullets or darts by the force of compressed air instead of gunpowder. It was known in France more than two centuries ago, but the ancients were acquainted with some kind of apparatus by which air was made to act upon the shorter arm of a lever, while the longer arm impelled a bullet. Various forms of construction have been adopted, those most usually seen having a condensing syringe inserted in the stock of the gun. The piston of this syringe is worked by an apparatus which passes through to the exterior of the gun; and this working causes a small body of air to be condensed into a chamber. The chamber has a valve opening into the barrel, just behind the place where the bullet is lodged. The gun is loaded from the muzzle, as with older patterns of muskets or fowling pieces, and there is at that time behind it a small body of highly compressed air, ready to rush out at any opening. This opportunity is afforded by a movement of the trigger, which opens the valve; the air rushes forth with sufficient impetuosity to propel the bullet with considerable force. By a certain management of the trigger, two or three bullets successively and separately introduced can be fired off by one mass of condensed air.

Another form of air-gun contains several bullets in a receptacle or channel under the barrel, but by the movement of a cock or lever, one of these bullets can readily be shifted into the barrel, and thus several successive discharges can be made after one loading—on a principle somewhat analogous to that of a revolver. Some varieties of air-gun have the condensing syringe detached, by which means a more powerful condensation of air may be produced; this done, the air-chamber is replaced in its proper position behind the bullet in the barrel. Those air-guns which present the external appearance of walking-canes usually have a chamber within the handle for containing condensed air. Double-barreled air-guns and guns having a combination of springs have also been introduced. One of the most successful guns now in use is the Quackenbush, which propels both darts and bullets, and is extensively used by recruits when learning the principles of aiming and firing. Pulling the trigger releases a piston, which is thrown forward by a spring, expelling the air from the chamber through the barrel with great force, carrying the dart or bullet before it. To load the gun, the barrel is pushed into the cylinder, which resets the piston and allows the projectile to be inserted through the opening, after which the barrel is drawn forward until brought up by a stop. The barrel is easily pushed into the chamber by placing the muzzle upon the floor or against some firm object. A magazine is attached to the latest model,

which holds 20 F shot. It can be quickly filled and operated, and saves the inconvenience and delay of handling the shot each time the gun is fired. Other patterns are capable of being used either as a rifle or a pistol, and, as a rule, they shoot well and strong, firing both darts and slugs. There are also combination air-guns which can be used as cartridge-rifles or air-guns, and which can be used for firing both in the gallery and in the field.

AIR-PLANTS. See EPIPHYTES, ORCHIDS.

AIR-PUMP, an instrument for removing the air from a vessel. Pumps for this purpose are very old, but have never attained much prominence until very recently, when the exhausting of the air from incandescent lamp bulbs has given great impetus to improvements and inventions in this direction. These pumps may be divided for the purposes of this article into two classes, mechanical A's and mercurial A's. The mechanical A. was invented by Otto Guericke (q. v.) in 1664, and its essential part is a hollow brass or glass cylinder, in which an air-tight piston is made to move up and down by a rod. From the bottom of the cylinder a connecting tube leads to the space which is to be exhausted, which is usually formed by placing a bell-glass, called the receiver, with edges ground smooth and smeared with lard, on a flat, smooth plate or table. When the piston is at the bottom of the barrel, and is then drawn up, it lifts out the air from the barrel, and a portion of the air under the receiver, by its own expansive force, passes through the connecting tube and occupies the space below the piston, which would otherwise be a vacuum. The air in the receiver and barrel is thus *rarefied*. The piston is now forced down, and the effect of this is to close a valve placed at the mouth of the connecting tube and opening inwards into the barrel. The air in the barrel is thus cut off from returning into the receiver, and, as it becomes condensed, forces up a valve in the piston, which opens outwards, and thus escapes into the atmosphere. When the piston reaches the bottom and begins to ascend again, this valve closes; and the same process is repeated as at the first ascent. Each stroke thus diminishes the quantity of air in the receiver; but from the nature of the process it is evident that the exhaustion can never be complete. Even theoretically, there must always be a portion left, though that portion may be rendered less than any assignable quantity; and practically the process is limited by the elastic force of the remaining air being no longer sufficient to open the valves. The degree of rarefaction is indicated by a *gauge* on the principle of the barometer. By means of the partial vacuum formed by the A., a great many interesting experiments can be performed, illustrating the effects of atmospheric pressure and other mechanical properties of gases. See *illus.*, ATMOSPHERIC PRESSURE, vol. I.; *illus.*, TORPEDOES, ETC., vol. XIV. As this A. only withdraws the air at the rate of one cylinder full for a double stroke of the piston, pumps with two barrels are frequently used, in which case the pistons are each attached to the same handle but each moves in an opposite direction to the other, the object being to double the work done at each stroke of the handle. A large number of modifications of this type of pump have been invented, all of which are the same in general principles. There are several reasons why such pumps do not continue the process of rarefaction indefinitely, but at a certain stage their effects cease and the tension of the air undergoes no further change. If the pump is not made very perfect the tension of the air will be considerable and even with the most perfect pump of this character the tension is always sensible. Leakage at various joints in the pump is one limiting cause to the action of the machine. It is impossible to prevent leakage entirely, and at the beginning of the operation the quantity of air which enters the receiver through leakage is very small in comparison with the amount pumped out. But as the exhaustion proceeds the leakage is faster on account of the reduced pressure in the receiver, and finally a limiting point is reached when the inflow and outflow are equal and no reduction in the tension of the air takes place. Another limit to the action of this machine is caused by the fact that there must always be some space between the bottom of the piston and the lower end of the cylinder, which is untraversed by the piston. At the beginning of the operation this space contains air at atmospheric pressure, which is rarefied at each stroke of the piston, but some tension always remains there, and when the air of the receiver reaches the same tension no further effect will be produced by the pump. Perhaps the most important trouble, however, with this type of A., as well as the most difficult one to remedy, is the absorption of air by the oil used for lubricating the pistons. This oil finds its way in a greater or less quantity to the bottom of the cylinder, where its absorbed air is partially given up at the moment the piston begins to rise. This class of pumps is not good enough for the manufacturers of incandescent lamps, and recourse has been had to the mercurial A. by means of which such a degree of exhaustion can be obtained as to reduce the pressure of the gas to something immeasurable. Mercurial A's were known in the 17th century, when Torricelli showed how to produce a vacuum by filling a tube over 30 in. long, and closed at one end, with mercury, and then inverting the open end, while temporarily closed, into a vessel containing mercury. The mercury in the tube then descends to the barometric height above the level of the mercury in the lower cup, and a vacuum is left in the top of the tube over the column of mercury. This is always alluded to as a Torricellian vacuum, and is the same as that in the ordinary barometer. In 1855 Geissler invented a mercurial A. in which the vacuum is produced by communication of the receiver with

the Torricellian vacuum. The original form of Geissler's pump is shown in Fig. 1, which will serve to illustrate the principle of its operation. It has received numerous modifications and improvements within the last few years, which make it one of the most efficient pumps in use. In all mercury pumps the parts are made of glass, the connections being made with rubber tubing. In Fig. 1, A is a large bulb, B is a tube about 3 feet long, C a rubber tube fastening the lower end of B to the vessel D, which

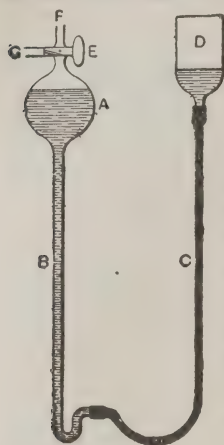


FIG. 1.

is open on top. A can be connected with either of the tubes G or F but not with both at once, or it can be shut off from both. The receiver to be exhausted is connected with G, and F leads to the open air. Enough mercury is used to fill A, B, C and D, as shown, and the vessel D is capable of being raised or lowered. The operation of the pump is as follows:— Suppose the vessel D is raised a little higher than A, as in the figure. The mercury will flow into the bulb A, which it fills if the cock E is turned so as to connect A with the outside air, F. The cock is then turned so as to connect A through the tube G with the vessel to be exhausted, the air in which at this stage is at atmospheric pressure. D is then lowered and the level of the mercury in A is lowered in consequence, the mercury running down B and C to D. As the mercury in A descends, air is drawn from the receiver through G into A so when the mercury has descended below A the whole space is filled with the air drawn through G, which, having expanded from the receiver attached to G is at less than atmospheric pressure. The cock E, is then turned so as to cut off communication between A and G. D is then slowly raised, and the mercury flows gradually back into A, compressing the air above it until it is at atmospheric pressure. At this point the cock E should be turned to connect A with the outside air F, and as D continues rising the mercury continues to drive out all of the air at F, until the bulb A is filled with mercury to the cock E, which is then closed so as to cut off all communication with A. When D is again lowered, the mercury does not begin to fall in A until D is about 30 inches below A. It then begins to descend, leaving a Torricellian vacuum above it, and D is lowered until A is empty. The cock is then turned so as to connect A with the receiver through G, and the remaining air in that vessel expands and fills A. The cock E is next turned off, D is raised, and the mercury rising in A compresses the air above it, until it is let out at F by turning the cock. By repeating this operation a sufficient number of times a vacuum is gradually produced in the receiver connected to G. When the operation is nearly finished, great care must be taken not to raise the vessel D too rapidly, or the impact of the mercury against the top of the bulb A will break the apparatus. It will also be seen that when the vacuum is nearly reached the mercury in A will be at the top of the bulb when D is about 30 inches below. If the valve should be turned to F at this point, the inrush of air would drive the mercury down. Therefore, no communication between A and F must be made until D has been raised on a level with E, and no communication between G and A must be made until D is lowered 30 inches again, otherwise mercury will run through G into the receiver being exhausted.

The Geissler pump just described may be taken as the type of mercury pump which are classified as upward driving, and, while a number of improvements in details have been introduced making them of a more practical form for factory use, this type all operate on the principle of connecting the receiver to be exhausted with Torricellian vacuum.

Sprengel brought out his well-known form of mercury pump in 1865, and Fig. 2 shows it in its simplest form. The Sprengel pump is a general type of what are classified as downward driving pumps. A is a funnel having a stop-cock C, and B is a tube of small bore called the shaft or fall-tube. The receiver to be exhausted is connected to the tube G, which branches off from near the top of the shaft. The tube B terminates very close to the bottom of the vessel D, which is provided with a spout F as shown leading to the cup E. The distance from the branch G to the top of the mercury in the vessel F must be at least 3 feet. A is filled with mercury which flows down the shaft B, the rate of flow being regulated by the cock C so that a very small stream is allowed to fall. This mercury in falling breaks up into short lengths, between which are small columns of air which flow in at the junction of G with the shaft B. The weight of the mercury forces these short columns of air down the shaft B to the mercury in D, from the surface of which they escape. The mercury as it runs into the cup E must be poured back into the funnel A. This operation continues until no more air is carried down with the mercury. When the vacuum is nearly completed, the mercury in the fall-tube will fall with a sharp rattling noise, showing that there is not enough air carried down with it to act as a cushion. With all kinds of mercury pumps, however, it is necessary to continue the operation for a considerable



FIG. 2.

time after the receiver is apparently exhausted. Even when no more air appears to be carried off by the pump the vacuum will improve as the operation continues. The reason for this is that the air sticks to the surface of the glass forming a sort of coating which is swept off the surface by the pump, but very slowly. The simple form of Sprengel pump is better than the simple Geissler pump, but is not well suited to factory work on account of the slowness of its action. This drawback is overcome to a great extent by supplying the pump with a number of fall-tubes which act together as a single one. For example, if six fall-tubes are used, the work of removing the most of the air is done in one-sixth of the time required by a single pump. After the greater part of the air is removed, however, the time taken to produce a good vacuum is not nearly so much reduced, and it is chiefly in the early part of the operation where the saving of time is effected. Another drawback to all mercury pumps is their liability to breakage even with the most careful usage. In the Sprengel pump, owing to the continual hammering of the mercury, the fall-tubes are very often broken, even after only a very short usage. A method is in use with both of these forms of pumps which consists of exhausting into a partial vacuum instead of into the atmosphere. This is accomplished by inclosing the part of the apparatus where the air is expelled in a chamber which is kept at a partial vacuum by means of a mechanical air-pump. By this means the mercury pump will work against a pressure much less than the atmospheric pressure, and consequently the fall-tubes and the height to which the mercury must be raised can be very much reduced, while the air is much more readily drawn down and out of the fall-tubes. In factory work the raising of the mercury from the lower to the upper level of the pumps is done mechanically and not by hand as shown in the illustrations. It may be raised by a force-pump, or in small buckets on an endless chain, or by air pressure. The latter may be simply atmospheric pressure and the mercury is raised by being broken up into small lengths with air spaces between, like a Sprengel pump working upwards into a vacuum chamber.

Mercury pumps are much superior to most mechanical pumps, but are by no means as perfect as could be desired, the greatest disadvantage being perhaps the slowness of operation. An efficient mechanical air-pump is greatly in demand, and several of these of novel design have been recently introduced, but up to the present time have not replaced the mercury pumps to any great extent.

AIR'Y, GEORGE BIDDELL, SIR, F.R.S., etc., astronomer royal, till his retirement in 1881; b. Alnwick, 1801. Educated principally at Colchester, he entered, in 1819, the univ. of Cambridge; in 1822 was elected scholar; in 1823 took the degree of B.A., with the honor of senior wrangler; and in 1826 that of M.A. In the same year he was elevated to the chair of science founded by Lucas, which he rescued from the reproach of being a sinecure by delivering a course of public lectures on experimental philosophy. In 1828 he was made Plumian prof., and had the management of the newly erected Cambridge observatory intrusted to him. On account of his severe and unintermitting labors in connection with this office, his income was augmented from the funds of the university. He published his observations (*Astronomical Observations*: Cambridge, 1829-38, 9 vols.), arranged in a clear and simple manner, and they have served as a model ever since for those of Greenwich and other observatories. In 1835, the office of astronomer royal becoming vacant, A. was appointed to it by lord Auckland, then first lord of the admiralty. He also introduced new or more perfect scientific instruments, more rapid methods of calculation, and researches in magnetism, meteorology, photography, etc. He contributed the well-known article on "Gravitation" to the *Penny Cyclopædia* (1837). Equally excellent and popular is his treatise on trigonometry, written for the *Encyclopædia Metropolitana* (1855). He also deservedly obtained the reputation of being one of the most able and indefatigable of living savants. He served on the royal commission appointed in 1868 to inquire into the standard weights and measures. In 1869 he communicated to the royal astronomical society a remarkable discovery on "Atmospheric Chromatic Dispersion, as affecting Telescopic Observation and the mode of correcting it." He invented the present system of correcting by means of magnets the disturbance of the compass in iron vessels. Among his numerous scientific writings are *Ipswich Lectures on Astronomy* (1851), *Algebraical and Numerical Theory of Errors of Observations* (1861), *Undulatory Theory of Optics* (1866), and *Treatise on Magnetism* (1871). He died Jan. 2, 1892.

AISLE (from Lat. *ala*, a wing) means any lateral division of any part of a church, whether nave, choir, or transept. The number of aisles varies in the churches of different countries. In England, there is only one on each side of the nave or choir; in most foreign countries there are generally two, and at Cologne there are even three. The continental edifices, it would seem, have antiquity in their favor for this arrangement (see **BASILICA**). The word is often incorrectly applied to the open space in the nave of churches between the seats of the congregation.

AISNE, a tributary of the Oise, in France, rises in the department of Meuse, and flows n. w. through the departments of Marne and Ardennes, and then w. through that of Aisne and part of Oise, where it falls into the river Oise, above Compiègne. Its length is 280 m., of which 75 are navigable. It is connected with the Meuse and Marne by canals.

AISNE, a department in the n. of France, formed of a part of ancient Picardy and the isle of France. It belongs to the basin of the Seine, and is intersected by the river A., and by other navigable streams and canals. The soil is fertile; the chief culture is wheat and other grain. Its rich meadows supply Paris with hay. The area is 2868 sq.m., with a pop. of (1896) 541,613. It is the seat of considerable cotton and other manufactures, the centre of which is St. Quentin (q.v.), and at St. Gobin is the famous manufactory of mirrors. The department is divided into 5 arrondissements and 37 cantons. The chief town is Laon (q.v.).

AITKIN, a co. in e. Minnesota, organized in 1873; intersected by the Mississippi river and by the Northern Pacific railroad; 1900 sq.m.; pop. '90, 2462. The s.w. portion is occupied by part of the lake of Mille Lacs. Co. seat, Aitkin.

AITON, WILLIAM, 1731-93; a Scotch botanist. He was trained as a gardener, and in 1754 became assistant to Philip Miller, superintendent of the garden at Chelsea. In 1759 he was made director of the botanical garden at Kew, and held the place until his death. His skill and care were of great service to this important scientific establishment. In 1789 he published his *Hortus Kewensis*, a catalogue of the plants in the great garden, with plates. This was re-edited by his son and successor in office.

AITZEMA, LIEUWE VAN, 1600-69, a Dutch author, whose *History of the Netherlands* from 1621 to 1668 is valuable for original documents. He was an active politician, and agent of the Hanse towns at the Hague.

AIX, a t. in France, formerly the capital of Provence, now the chief t. of an arrondissement in the department of the Bouches-du-Rhône. It is believed to have been built by the Roman consul, C. Sextius (120 B.C.), on account of the mineral springs in the neighborhood, and thence called Aquæ Sextiæ. A. is the seat of a court of appeals; and possesses an academy for theology and law, and a public library which reckons over 100,000 vols. and 1100 MSS. The baptistery of the cathedral is believed to have been originally a temple of Apollo. The numerous public fountains give a cheerful air to the place. One of them has a sculpture of the good king René, executed by David. There is also an old clock-tower, the machinery of which, when the clock strikes, sets various quaint-looking figures in motion. The industry of this again flourishing town consists chiefly in the cultivation of the olive, in cotton-spinning, leather-dressing, and trade in oil, wine, almonds, etc. The warm springs are slightly sulphurous, with a temperature from 90° to 100° F., clear and transparent as the purest well-water, almost free from smell, yet with a slightly bitter taste. They have the reputation of improving the beauty of the skin, and are on this account especially frequented by the fair sex. The field on which Marius defeated the Teutones lies in the plain between A. and Arles. In the middle ages, under the counts of Provence (see RENÉ), A. was long the literary capital of southern Europe. The pop. of A. in '91 was 22,924.

AIX, or **AIX-LES-BAINS**, a small town of Savoie, France, in a delightful valley near lake Bourget, 7 m. n. from Chambéry. It was a much frequented bathing-place in the times of the Roman empire, and among its numerous remains of ancient times are the arch of Campanus, the ruins of a temple and of a vaporarium. The hot springs, two in number, are of sulphurous quality, and of a temperature above 100° F. They are used both for drinking and as baths, and attract annually a large number of visitors. Pop. about 4000.

AIX-LA-CHAPELLE (Ger. Aachen) is the capital of a district in Rhenish Prussia. It is situated in a fertile hollow, surrounded by heights, and watered by the Wurm; population of commune, 1895, 110,489, of whom a very small proportion are Protestants. A. is the center of numerous thriving manufactories, especially for spinning and weaving woolen fabrics, and for needle and pin-making. There are also immense manufactures of machinery, bells, glass buttons, chemicals, cigars, etc. As a principal station on the Belgian-Rhenish railways, A. is an important staple place of Prussian trade. The city is rich in historical associations. It emerges from historical obscurity about the time of Pepin, and Charlemagne founded its world-wide celebrity. Whether it was the birthplace of Charlemagne is doubtful, but it became his grave 814 A.D. In 796 A.D., Charlemagne caused the already existing palace, called the imperial palace, to be entirely rebuilt, as well as the chapel, in which Pepin had celebrated Christmas in 765 A.D. The two buildings were connected by a colonnade, which fell into ruins a short time before the emperor's death, probably from the effects of an earthquake. The present town-house has been built on the ruins of the palace; the chapel, after being destroyed by the Normans, was rebuilt on the ancient plan by Otho III., in 983, and forms the nucleus of the present cathedral. This ancient cathedral is in the form of an octagon, which forms, on the outside, a sixteen-sided figure. See illustration, DOMES, vol. V. figs. 7, 8. In the middle of the octagon, a stone, with the inscription "CAROLO MAGNO," marks the grave of Charlemagne. Otto III. opened the vault in the year 997 A.D. The body of the emperor was found in a wonderful state of preservation, seated upon a marble chair, dressed in his robes, his scepter in his hand, the gospel on his knee, a piece of the holy cross on his head, and a pilgrim's scrip attached to his girdle. Otto caused the tomb to be built up again, after repairing the injuries of the arch. In 1165 A.D., when the emperor Frederick I. caused the vault to be re-opened, the bones of the great emperor

were enshrined in a casket of gold and silver, and a large and beautifully wrought chandelier was hung up over the tomb as a memorial. In 1215 A.D., Frederick II. caused the remains of the emperor to be inclosed in a costly chest, in which they are yet kept in the sacristy. The marble chair was, in later times, overlaid with gold plates, and used till 1558 A.D. at the imperial coronations, as a throne for the newly crowned emperor. The imperial insignia were removed to Vienna in 1795.—In the 14th c., a choir in the Gothic style was added to the east side of the octagon, which had been built in the Byzantine style; while on the west side a square belfry was joined to it, as well as two small round towers, with winding stairs leading to the treasury. Here are kept the so-called "great relics," which, once in seven years, are still shown to the people, in the month of July, from the gallery of the tower. This spectacle attracts many thousands of strangers to A. Much has of late years been done to restore this venerable pile. The columns brought by Charlemagne from the palace of the Exarch at Ravenna, to decorate the interior of the octagon, had been carried off by the French; and although part of them had been restored at the peace of Paris, they were not replaced in the building till recently.

The town-house—which incloses the remains of the imperial palace—adorns the market-place, having the bell or market tower on the left, and on the right the Granus tower, a memorial of old Roman times. The coronation hall, 162 ft. long, by 60 ft. wide, in the interior of the town-house, was, in the last century, divided in the middle by a wooden partition. This noble hall, in which thirty-five German emperors and eleven empresses have been crowned, has been restored to its original form, and the walls have been decorated with large fresco-paintings of scenes from the life of Charlemagne, by Rethel. Before the town-house stands a beautiful fountain, with a bronze statue of Charlemagne. In the church of the Franciscans are to be seen a fine picture of the taking down of Christ from the cross, by Vandyck, and two other pictures representing the crucifixion, by A. Diepenbeeck. At a short distance from A., and surrounded by the river, stands Frankenburg, once the favorite residence of Charlemagne and of Fastrada, and still rich in legends. It has been rebuilt from its romantic ruins. As at A. has recently been much improved. It now possesses many fine buildings, among which are several large and splendid hotels. From being a quiet old city of historical interest, it has become a busy center of manufacturing industry. In 1870, a new polytechnic school was erected. A. was formerly noted for its gambling-tables; but these are now disallowed.

The name of Aix or Aachen is evidently derived from the springs, for which the place has been always famous (see AA.). The name Aquis Granum, which it received about the 3d c., may possibly be derived from Granus, one of the names of Apollo, who was worshiped by the Romans near springs. The French name, A., refers to the chapel of the palace. Charlemagne granted extraordinary privileges to this city. The citizens were exempted, in all parts of the empire, from personal and military service, from imprisonment, and from all taxes. The city also possessed the right of sanctuary: "the air of A. made all free, even outlaws." In the middle ages this free imperial city (then included in the circle of Westphalia) contained more than 100,000 inhabitants, and held an important place among the confederated cities of the Rhine. The emperors were crowned in A. from Louis the Pious to Ferdinand I. (813–1531 A.D.); 17 imperial diets and 11 provincial councils were held within its walls. The removal of the coronations to Frankfort, the religious contests of the 16th and 17th c., a great fire which in 1656 A.D. consumed about 4000 houses in the city, combined with other causes to bring into decay this once flourishing community. In Jan., 1793, and again in 1794, A. was occupied by the French. By the treaties concluded at Campo Formio and Lunéville, it was formally ceded to France, and became the capital of the department of Roer; at length, in 1815, the city fell to Prussia. See Quix, *Geschichte der Stadt A.* (History of A.), 2 vols., A., 1841.

The MINERAL SPRINGS of A., of which six are hot, and two cold, were known in the time of Charlemagne, and were much frequented as early as 1170. The hot springs are strongly sulphurous, and contain also hydrochlorates. The temperature varies from 111° to 136° F. They chiefly act on the liver and on the mucous surfaces and skin, and are therefore efficacious in cases of gout, rheumatism, cutaneous diseases, etc. The most remarkable is the "emperor's spring," which rises in the middle of the Hôtel Kaiserbad. The baths themselves are from 4 to 5 ft. deep, and are built quite in the old Roman style. The cold springs are chalybeate and not so copious. The new "Eisenquelle" (iron spring), first discovered in 1829, is provided with an elegant bath-house. The well-proved medicinal virtues of the mineral springs of A. bring yearly to the city many thousands of strangers.

TREATIES OF PEACE, and CONGRESS OF A.—The first peace of A. ended the war carried on between France and Spain for the possession of the Spanish Netherlands. On the death of Philip IV., Louis XIV. laid claim to a large portion of those territories in the name of his wife, Maria Theresa, the daughter of Philip, urging the law of succession prevailing in Brabant and Namur respecting private property. The victorious progress of Louis was checked by the triple alliance between England, Holland, and Sweden, and a treaty of peace was concluded at A. in 1668, by which France retained possession of the fortresses of Charlerois, Lille, etc., which she had already taken.

The second peace of A. concluded the war respecting the succession of Maria Theresa

to the empire. See **SUCCESSION, WARS OF**. After the war had been carried on with various success for eight years, peace was concluded in 1748. In general the possessions of the several states remained as before the war. Austria ceded Parma and Placentia to the Spanish infant, Philip; and the possession of Silesia was guaranteed to Prussia. The privilege of the *Assiento* treaty (q.v.) was anew confirmed to England for four years, and the pretender was expelled from France. Owing chiefly to the exertions of her minister, Kaunitz, Austria came off with but small sacrifice, while England, notwithstanding her splendid victories, derived little solid advantage, and was left with a debt raised to 80 millions.

The congress of A. was held in 1818, for regulating the affairs of Europe after the war. It began on the 30th Sept. and ended on the 21st Nov. Its principal object was the withdrawal from France of the army of occupation, 150,000 strong as well as the receiving of France again into the alliance of the great powers. The emperors of Russia and Austria and the king of Prussia were personally present. The plenipotentiaries were Metternich, Castlereagh, and Wellington, Hardenberg and Bernstorff, Nesselrode, and Capo d'Istria, with Richelieu on the part of France. France having engaged to complete the payment of the stipulated sums of money, was admitted to take part in the deliberations, and the five great powers assembled signed a protocol announcing a policy known as that of the "holy alliance" (q.v.).

AIZA'NI, or **AZANI**, a city in Phrygia, mentioned by Strabo. In 1824 its remains were found by the earl of Ashburnham about 30 m. s.w. of Kutaieh. There was a temple of Jupiter, a theater, a stadium, and gymnasium; the theater is in good preservation—its long diameter 185 ft.; it had 15 rows of marble seats. The Rhyndacus (now Adranus) rises near the site of A. and passes through it; it was crossed by two white marble bridges, each of five semicircular arches. Tombs, Roman coins, and inscriptions have been found.

AJACCIO, the chief t. of the island of Corsica, which forms a department of France. Pop. in '91, 20,197. The chief employments are the anchovy and pearl fisheries, and the trade in wine and olive-oil, which the neighborhood produces in abundance, and of good quality. The harbor is protected by a strong fort. A. is remarkable as the birthplace of Napoleon; the house is still to be seen.

AJ'ALON, a town in ancient Palestine, 14 m. n.w. of Jerusalem, in the tribe of Dan, also spoken of as belonging to Ephraim, Benjamin, and Judah. It is noticeable only as the recorded place where Joshua commanded the moon to stay its course till he had finished his battle. The modern town is Yalo.

AJAN', a portion of the e. coast of Africa, extending from Cape Guardafui nearly to the equator.

A'JAX was the name of two of the Greek heroes of the Trojan war. One of them was called A. the less, or the Locrian, being the son of Oileus, king of the Locrians. At the head of 40 Locrian ships he sailed against Troy, and was one of the bravest of the Greek heroes; in swiftness of foot he excelled all except Achilles. When Cassandra fled to the temple of Minerva, after the taking of Troy, it is said that A. tore her from it by force, and dragged her away captive. Others make him even violate the prophetess in the temple. Though he exculpated himself by an oath when accused of this crime by Ulysses, yet he did not escape the vengeance of the goddess, who caused him to be engulfed in the waves.

The other A., called by the Greeks the greater, was the son of Telamon, king of Salamis, and, by his mother's side, a grandson of Æacus. He sailed against Troy with 12 ships, and is represented by Homer as, next to Achilles, the bravest and handsomest of the Greeks. After the death of Achilles, A. and Ulysses contended for the arms of the hero, and the prize was adjudged to Ulysses, which threw A. into such a state of rage and despair that he killed himself with his sword. This melancholy fate of the hero is the subject of one of the extant tragedies of Sophocles.

AJEHO', or **ASHEHOH**, also called **ALCHUKU**, a city of Manchuria in the Chinese empire; 80 m. s. of the Soongaree and 125 m. n. of Kirin. A. is in a fertile region, abounding in grain. The people of the district are exclusively Chinese immigrants, who get the soil at a nominal price on agreeing to reclaim and cultivate it. Pop. about 40,000, of whom a considerable number are Mohammedans.

AJMEER, one of the districts of Hindostan, directly under the government of India, lying between lat. 25° 43' and 26° 42', long. 74° 22' and 75° 33'. Its length from s.e. to n.w. is about 80 m.; breadth, 50; area, 2,661 sq.m. The surface of the country towards the s.e. is generally level. In the n., n.w., and w. it is broken by mountains and hills belonging to the Aravulli range. The mountain of Taragurh, above the city of Ajmeer, contains carbonate of lead, manganese, copper, and abundance of iron ore. The general elevation of the plain of A. is about 2000 ft., and the frosts in winter are sometimes severe. Strong breezes are prevalent, and the climate on the whole is healthy. The scarcity of water, however, often occasions great distress. The only permanent stream is the Koree, the water of which is so impregnated with mineral salts as to be unfit for alimentary use except during the rains. To compensate for this deficiency, water-tanks are numerous. The staple crop is bajra (*holcus spicatus*). Sheep are reared in great numbers, and wool is cheap, affording the material of their clothing to the lower orders. Among the more

prevalent diseases are small-pox and ophthalmia. The population in 1891 was 542,358, of whom four-fifths were Hindoos. The principal race is the Rajpoots. The present limits of this district by no means correspond to its former importance. In the 12th c., at the time of the Mussulman invasion, the sultan of A. and Delhi was the most powerful monarch of India. Under Akbar also, who acquired this territory in 1559, A. was a large and important province. It afterwards fell into the hands of the Mahrattas, from whom it was wrested by the British in 1817.

AJMEER, an ancient city of Hindostan, the capital of the British district of the same name, 228 m. w. from Agra. It is situated in a picturesque and rocky valley, at the foot of the mountain of Taragurh, which is crowned by a fort. The city is surrounded by a stone wall, with five lofty and handsome gateways on the w. and n. Most of the streets are narrow and dirty, but some of them are spacious, and contain many fine residences, besides several mosques and temples of very massive architecture. The Daulat Bagh or "garden of splendor" is now the residence of the British commissioner of the district. A. is the seat of the British political agency, Ajmeer college and Mayo college. The tomb of the Mussulman saint, Kwajah, within the town, is held in great veneration, and pilgrimages are made to it even by Hindoos. The emperor Akbar journeyed to it from Agra on foot in 1570, in fulfillment of a vow after the visit of his son Jehanghir. In October, a great annual fair is held in honor of the saint, at which ridiculous miracles are pretended to be wrought. The pop. of A. in '91 was 68,843.

AJURNO'CA, town of the province of Minas Geraes, Brazil, 100 m. n. e. from Rio de Janeiro. It is situated in a fertile country, at the northern base of the Sierra Mantiqueira, on the river Ajuruoca, one of the head-waters of the Parana. The surrounding district once yielded much gold, which has apparently been exhausted: but it produces excellent crops of tobacco, millet, mandioc, sugar, and coffee. Swine are reared for the market of Rio de Janeiro. Population about 17,000.

AK'ABAH, a village near the gulf of A., on the e. arm of the Red sea, supposed to occupy the site of the Elath of Scripture. Ruins in the sea a short distance to the s. still bear the name Ezion-geber. In remote ages A. enjoyed a large trade.

AK'ABAH, GULF OF, the Sinus Ælaniticus of antiquity; the eastern of the two divisions of the n. end of the Red sea, running into Arabia Petraea about 100 m. n.e., with a width of 12 to 17 m. Navigation is difficult on account of reefs and sudden squalls. The only good harbor is Golden Port, on the w. shore, 33 m. from the entrance and 29 m. e. of Mt. Sinai.

AK'BAR (i.e., "very great"), properly JELAL-ED-DIN-MOHAMMED, emperor of Hindustan, the greatest Asiatic monarch of modern times. His father, Humayun, was deprived of the throne by usurpers, and had to retire for refuge into Persia; and it was on the way thither, in the town of Amerkote, that A. was b., in 1542 A.D. Humayun recovered the throne of Delhi after an exile of 12 years; but d. within a year. The young prince at first committed the administration to a regent-minister; but finding his authority degenerating into tyranny, he, by a bold stroke, shook it off, and took the power into his own hands (1558). At this time, only a few of the many provinces once subdued by the Mongol invaders were actually subject to the throne of Delhi; in 10 or 12 years, A.'s empire embraced the whole of Hindostan s. of the Deccan; but although great in subduing, A. was yet greater in ruling. The wisdom, vigor, and humanity with which he organized and administered his vast dominions, are unexampled in the e. He promoted commerce by constructing roads, establishing a uniform system of weights and measures, and a vigorous police. He exercised the utmost vigilance over his viceroys of provinces and other officers, to see that no extortion was practiced, and that justice was impartially administered to all classes of his subjects. For the adjustment of taxation, the lands were accurately measured, and the statistics taken, not only of the pop., but of the resources of each province. For a Mohammedan, the tolerance with which he treated other religions was wonderful. He was fond of inquiries as to religious beliefs; and Portuguese missionaries from Goa were sent at his request to give him an account of the Christian faith. He even attempted to promulgate a new religion of his own, which, however, never took root. Literature received the greatest encouragement. Schools were established for the education both of Hindoos and Mohammedans; and numbers of Hindoo works were translated from Sanscrit into Persian. Abu-l-Fazl, the able minister of A., has left a valuable history of his master's reign, entitled *A.-nameh* (history of A.); the third volume, containing a description of A.'s empire, derived from the statistical inquiries above mentioned, and entitled *Ayin-i-Akbari* (institutes of A.), has been translated into English by Gladwin (3 vols., Calcutta, 1786; and London, 1800). A.'s latter days were embittered by the death of two of his sons from dissipation, and the rebellious conduct of the third, Selim (known as Jehanghir), who succeeded his father at his death in 1605.

AKBARPUR', a town in the northwestern provinces of British India, 80 miles northeast of Allahabad and 25 miles east southeast of Faizabad. Population about 7400.

AKEE' (*Chupania* or *blighia sapida*), a fruit-tree belonging to the natural order *sapindaceæ* (q.v.), a native of Guinea, introduced into Jamaica in the end of last century. It grows to the height of 20 to 25 ft. or upwards, with numerous branches and alternate pinnate leaves, resembling those of the ash. The flowers are small, white, on axillary racemes; the fruit is about the size of a goose's egg, with three cells and three seeds, and its succulent aril has a grateful subacid flavor. The fruit is little inferior to a nectarine. Boiled down with sugar and cinnamon it is used as a remedy for diarrhea. The distilled water of the flowers is used by negro women as a cosmetic. The A. sometimes produces fruit in stoves in Britain. In order to obtain this, the roots should be cramped in pots. —The AKI of New Zealand is a totally different plant, *metrosideros buxifolia*, of the natural order *myrtaceæ*, a shrub, which sends out lateral roots, and so attains the summits of the loftiest trees.

A KEMPIS, THOMAS. See KEMPIS, THOMAS A.

A'KENSIDE, MARK, an author of considerable celebrity, in his own day, on account of his didactic poem, *The Pleasures of the Imagination*, and some medical works. He was b. Nov. 9, 1721, at Newcastle-on-Tyne, where his father was a butcher. Being intended for the Presbyterian church, he was sent to study theology at Edinburgh, but soon abandoned it for that of medicine. He graduated as a physician at Leyden in 1744, and practiced at Northampton, then at Hampstead, and finally in London. His success as a practicing physician was never very great, owing, it is said, to his haughty and pedantic manner. He d. in London (June 23, 1770), soon after being appointed one of the physicians to the queen. At Leyden he had formed an intimacy with Jeremiah Dyson, and this rich and generous friend allowed him £300 a year. Some of his medical treatises, as those on the lymphatic vessels and on dysentery, possess considerable merit. His later poetry, consisting chiefly of odes and hymns, did not attain the same reputation as his *Pleasures of the Imagination*, which was written in his twenty-third year, and to which is owing whatever celebrity has attached to his name. Dyson published his poetic works in 1772, and another edition appeared in 1807. In *Peregrine Pickle*, Smollett has satirically sketched the character of A. under that of the pedant who undertakes to give an entertainment after the manner of the ancients. A. has little originality of conception, or even of expression; the reader is carried along for a time by the evident enthusiasm of the poet, and rapid and stately march of lofty images and ideas; but, as it has been well expressed, "all is operose, cumbrous, and cloudy, with abundance of gay coloring and well-sounding words, but filling the eye oftener than the imagination, and the ear oftener than either." A. became dissatisfied with his juvenile production, and at his death had written a portion of a new poem on the same subject. Both poems were published in the complete edition of his works, Lond., 1773. His life has been written by Bucke: *Life, Writings, and Genius of A.* (8vo, Lond., 1832).

A'KERBLAD, JAN DAVID, 1760-1819; a Swedish archæologist, learned in Runic, Coptic, ancient Egyptian and Phœnician literature. He was secretary of the Swedish embassy to Constantinople, whence he went to Jerusalem and the Troad in 1792-97. He was also ambassador at Paris. His last years were spent in Rome, where he was sustained by a pension from the duchess of Devonshire.

AKERS, BENJAMIN PAUL, 1825-61. An American sculptor. He began life as a printer, but in 1849 opened a studio in Portland, Me., and made busts of Longfellow and others. In 1851-52 he went to Italy, and on his return made a statue of "Benjamin in Egypt," which was exhibited in the New York Crystal Palace in 1853. He went to Rome in 1855, remaining three years, producing "Una and the Lion," a statue of "St. Elizabeth of Hungary," the "Dead Pearl Diver," and an ideal head of Milton, which last two are described in Hawthorne's *Marble Faun*.

AKETON, another name for a portion of armor used in the feudal times called the gambeson, consisting of a wadded doublet generally worn under the hauberk (q.v.).

AKHALZIKH', or AKISKA, a t. of Russian Armenia, 90 m. w. from Tiflis, on the left bank of the Dalka, an affluent of the Kur. It is situated in a valley of the Keldir mountains, and at such an elevation above the sea that the winter is severe, although the summer is very hot. A. was anciently called Keldir or Chaldir. It is without walls, but has a strong citadel, built on a rock. The mosque of Sultan Ahmed, built on the model of St. Sophia, in Constantinople, has a library attached to it which was accounted one of the most valuable in the east, but the Russians, after acquiring possession of A., carried off great part of its most valuable treasures to St. Petersburg. Some manufactures are carried on in the town, and it maintains an active trade with various places on the Black sea. It is the seat of an archbishopric of the Greek church. Pop. abt. 15,000, two-thirds of whom are Armenians.

AK-HISSAR' (anc. *Thyatira*), a town of Asia Minor, in Anatolia, 52 m. n.e. from Smyrna, on somewhat elevated ground in the valley of the Hyllus. The streets are paved with carved stone, and other relics of antiquity abound; but there are no ruins of ancient buildings. Cotton goods are exported. Pop. estimated at 12,000, of whom two-thirds are Turks and the remainder mostly Greeks.

AKHLAT', or **ARDISH**, a t. of Asiatic Turkey, on the north shore of lake Van, and 95 miles from Erzerum. It is surrounded by a double wall and moat, and further protected by towers and a citadel. Pop. estimated at 2000. The old city of A., at a little distance from the present town, in a ravine, was the residence of the kings of Armenia, and was the scene of many conflicts between the Greeks, Armenians, and Persians. It was taken and devastated in 1228 by Jelal-ud-deen, and completely destroyed by an earthquake in 1246. It is the seat of an Armenian bishop.

AKHOOND OF SWAT, **THE**, a Mohammedan saint (d. 1878), who exercised great influence and had almost unquestioned authority over Mohammedans in the east, reigning supreme as the guide and director of the hearts of men all over high Asia. His residence was the resort of pilgrims, who came as many as 300 in a day, from Bengal, Bokhara, Constantinople, Persia, Tunis, and even Mecca, to consult him on questions of every kind. For half a century the English E. India government was assiduously watching this man, who possessed a power which no other person in Asia could pretend to wield; but the A. generally kept on friendly terms with the English. In 1877, the Ameer of Afghanistan sought his advice in regard to the proper course in the Russo-Turkish war.

AKHTYRKA, a t. of European Russia, in the government of Kharkov, and 58 m. n.w. from Kharkov. It is situated on a small river of the same name, an affluent of the Dnieper. It was founded by the Poles in 1641. It has manufactures of light textile fabrics, and a great annual fair. The neighborhood is very fertile. Pop. about 26,000.

AK'IBA, **BEN JOSEPH**, a famous rabbi and teacher of a large school at Jaffa in the 1st or 2d c., said to have had at one time 24,000 pupils. He was in the great Jewish revolt against Rome, taking the side of Bar-Cochba, or Bar-Cochebas, the pretended Messiah, and acted as his sword-bearer. He was taken prisoner by the Romans, and it is said that he was flayed alive, but bore his pains with wonderful fortitude. He is reported to have been 120 years old at death. Jews were long accustomed to visit his tomb, and his is one of the names of ten martyrs still found in a Hebrew penitential prayer. The traditions concerning him are numerous; and many unfounded statements have been made, one of which even identifies him with Bar-Cochba.

AK'JERMANN, or **AKKERMANN**, a t. of Russia, in Bessarabia, on the Black sea, at the mouth of the Dniester, with a citadel and harbor; pop. about 46,000. It is the Alba Julia of the Romans, and called, by the Poles, Bialogrod, which, as well as A., signifies the *white town*. It is of some importance on account of its harbor, fortifications, commerce, and especially its extensive salt-pits.

The treaty (supplementary of that of Bucharest, 1812) concluded at A. in 1826, between Russia and Turkey, secured to Russia the free navigation of the Black sea, and indemnification for losses sustained by her subjects from the Barbary corsairs; the institution of divans in Moldavia and Wallachia, and the power of re-electing the hospodars after their term of office; and the restoration of the privileges of Servia, in which Turkish troops were only to retain possession of the fortresses. The boundaries in Asia were to remain as they then stood; Russia consequently retaining the Turkish fortresses of which she had gained possession. The non-fulfillment of this treaty on the part of the Porte occasioned the war of 1828, which was terminated by the peace of Adrianople.

AKKAD. See **ACCAD**.

AKMOLINSK, a province of Siberia, organized 1868. It is composed of five districts, of which the principal towns are Omsk, Akmolinsk, Atbasar, Kokchetav and Petropavlovsk. Agriculture, cattle-raising, and tobacco-growing are carried on, and gold, silver, iron, and copper are found in the mountains. Population, 1890, 500,180.

AKOLA, a t. in India, on the Nagpur extension of the great Indian Peninsular railway, in 20° 6' n. and 76° 2' e.; pop. abt. 15,000. There are in the t. some rich merchants, and two markets are held each week. Besides the ordinary public buildings there is one English church. A. is the headquarters of the district of the same name.

AKRON, city, capital of Summit county, Ohio, on the highest point of land in that region. It is thirty-five miles south of Cleveland on the Ohio and Erie Canal, Baltimore and Ohio and other railways, contains several parks, a city hospital, public library, Buchtel College, and excellent public schools. It has (1897) 132 industrial establishments, including a great variety of manufactures, among which may be mentioned printing and lithographing, iron, steel, sewer pipes, rubber, matches, foundry products, pottery, linoleum, paper, boilers, agricultural implements, electrical manufactures, tiles, and lumber. Electrical railways connect the city with Kent, Cuyahoga Falls, Northfield, Bedford, and Cleveland. It is lighted by electricity, derives its water supply from springs, has good banking facilities, many churches, and several newspapers. Pop. 1890, 27,601.

AK-SHE'HR (*white city*, anc. *Philomelion*), a city of Asiatic Turkey, in the pashalik of Karaman, five m. s. of the salt lake of Ak-shehr, at the entrance of an extensive mountain valley. The houses rise in successive terraces on the slope of a hill. There is here a celebrated carpet manufactory. Pop. about 15,000.

AK-SU', a t. of eastern Turkestan, 260 m. n. e. from Yarkand, on an affluent of the Tarim, and on the southern base of the Thian-shan mountains. It was formerly the residence of the kings of Kashgar and Yarkand. While eastern Turkestan formed part of the Chinese empire it was an important garrison t. In 1867 it was captured by the Atalik-Ghazee. In 1716 it was nearly destroyed by an earthquake, and in the beginning of the present century suffered terribly from an inundation. It is celebrated for its manu-

factures of cotton cloth and saddlery. It is much resorted to by caravans as an entrepôt of commerce between Russia, Tartary, and China. The pop. of A. is variously estimated from 6000 to 20,000 and upwards. Sheep and cattle are extensively reared in the neighborhood. See **TURKESTAN, EASTERN.**

AKYAB, a t. of Further India, the chief sea-port of the district of A. or Aracan proper, and the capital of the province of Aracan. It was formerly called Twet-twe, and sometimes still receives that name. It is situated on the eastern side of the island of A., at the mouth of the Kuladyne or Coladyne. The houses are well built, the streets broad and regular. The t. is rapidly rising in commercial importance. Light-houses have been erected for the benefit of the harbor. Pop. 1891, 38,000.

AL, **IL**, or **UL**, the only article in the Arabic language. When before a lingual or dental the sound of the *l* is dropped, the following letter taking a double force, as "Il shams" (the sun), pronounced "ish shams." When the word preceding the article ends with a long vowel, the *a* in A. is dropped, and the *l* joined to the vowel sound: Example, "Abuil Feda," pronounced "Abulfeda."

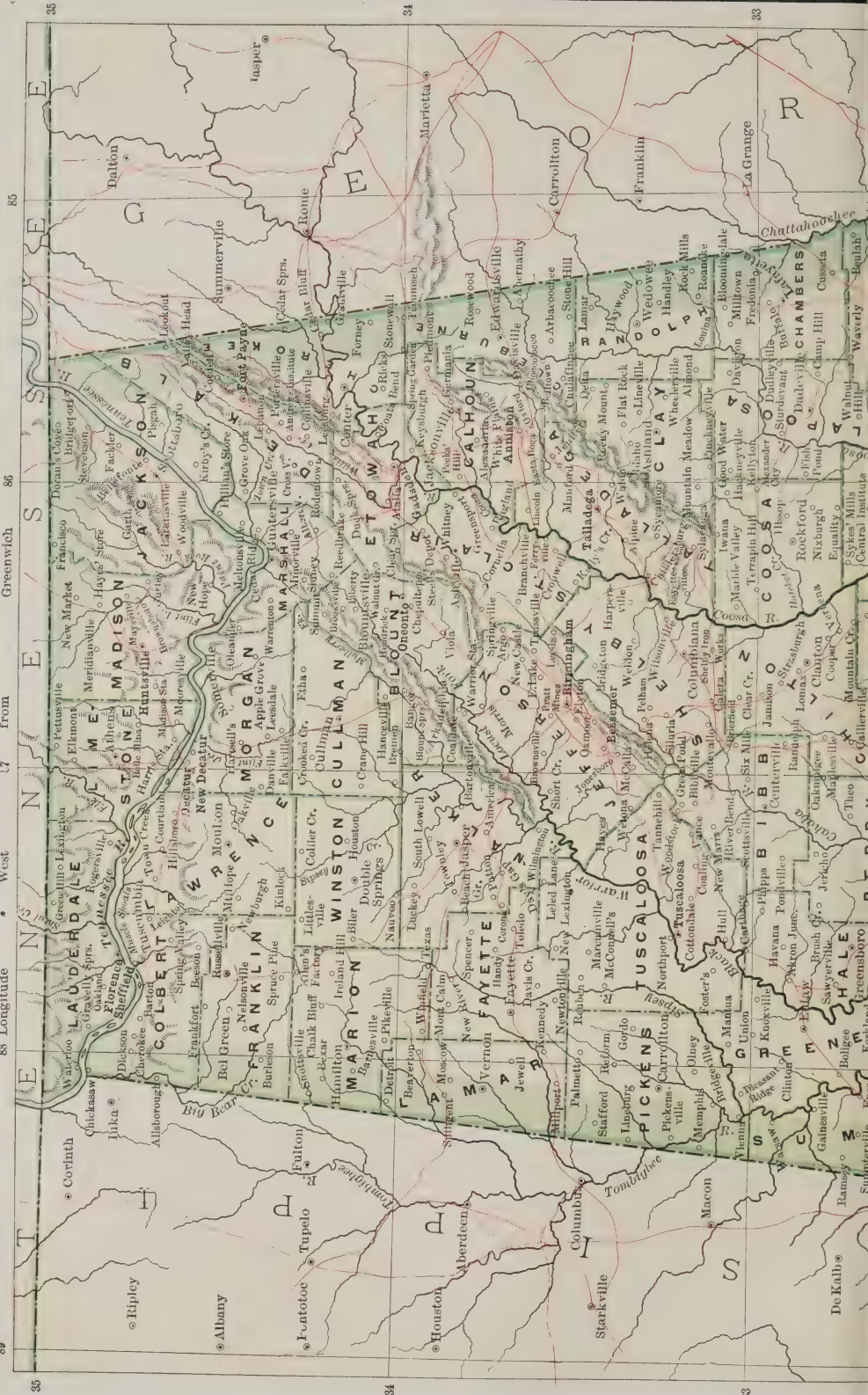
ALABAMA, one of the Gulf states, and the 9th in order of admission; between lat. 30° 10' and 35° n.; long. 84° 53' and 88° 30' w.; bounded on the n. by Tennessee, on the e. by Georgia, on the s. by Florida and the gulf of Mexico, on the w. by Mississippi; length about 336 m. from n. to s.; average width, 175 m.; total area, 52,250 sq. m., or 33,440,000 acres. The arms of the state, adopted in 1868, represent an eagle just alighting on a shield. In his left claw he holds several arrows, and in his beak a streamer on which is inscribed the words, "Here we rest." See **POPULAR NAMES OF STATES.**

HISTORY.—In 1540 De Soto passed through the territory now included in A., and among the Indian tribes that opposed him were the Chickasaws and Choctaws, whose domain lay w. of the A. river. Further w., on the Yazoo, were the Alibabams, from whom the present state derived its name. Shortly after, the Muscogees or Creeks, who had wandered from the s.w. to the Ohio, overspread the country between the Alabama and Coosa and the Savannah. In 1702 the French, under Bienville, removed from Biloxi bay, where a fort had been built in 1699; made Dauphin Island, at the entrance of Mobile bay, a provision depot, and higher up erected fort St. Louis. The situation of this proving unhealthy, Mobile was founded in 1711, and until 1723 was the seat of government of the vast Louisiana territory of which Bienville was the first *commandant*. In 1714 Fort Toulouse was built at the junction of the Coosa and Tallapoosa. The colony was hindered by disease and poverty from growing rapidly; the Chickasaws remained hostile; and the English planted their trading posts in the wilderness n. of Mobile. If the Choctaws and the greater part of the Creek nation had not become their allies, the French would have held their ground with difficulty. In 1763 France ceded to Great Britain her possessions e. of the Mississippi, and by a new division, that continued from 1764–81, all of A. and Mississippi lying n. of the parallel of 32° was included in the province of Illinois; all s., in that of West Florida. During the revolution, West Florida, which had by that time gained English and Scotch settlers, remained loyal, and in 1779–80 Spain took advantage of her own war with Great Britain to seize the province. Her treaty of peace with Great Britain in 1783 confirmed her right to it, but the U. S. claimed that all above 31° was included in the territory ceded Great Britain. Georgia, a third claimant, insisted that West Florida belonged to her by charter right, and in 1794–95 attempted to sell a large part of it. (See **YAZOO FRAUD.**) In 1795 Spain gave up her claim, and in 1802 Georgia hers, congress having meanwhile (1798) organized the disputed section into the Mississippi territory. In 1801 Louisiana was transferred by Spain to France, and in 1803 sold by France to the U. S., excepting the strip s. of 31° and between the Mississippi and Perdido, which Spain had continued to hold. In 1804 the n. boundary of Mississippi territory was extended to the state of Tennessee, and the settlement of the Tennessee valley soon followed. In 1810 the region from Baton Rouge to the Pascagoula was forcibly annexed to Louisiana by its English-speaking inhabitants, and in 1813, April 13, the Mobile district was surrendered to an U. S. force under Gen. Wilkinson; the secret alliance of the Spanish with the British giving sufficient excuse for seizing it. Incited by the British, the Creeks and their allied tribes rose in 1812 against the people of A.; their atrocities culminating in the great massacre at Fort Mimms on the A. river, Aug. 30, 1813. Gen. Jackson headed the forces sent against the Indians, and by his victories at Talladega and elsewhere, 1813–14, humbled them so completely that they surrendered their territory w. of the Coosa and s. of Wetumpka. There was, however, more or less trouble with them until their removal, 1832–36, to Indian territory. The closing events of the war were the unsuccessful attack of the British on Fort Bowyer, Mobile Point, Sept. 13–15, 1814, and its surrender to them, Feb. 13, 1815. Mississippi was set off March 1, 1817; the territory of A. was formed March 3, with its seat at St. Stephens; the first legislature met at Huntsville, Jan. 19, 1818, and the state was admitted to the union Dec. 14, 1819. In 1820 the seat of government was removed to Cahawba; in 1826 to Tuscaloosa; and in 1847 to Montgomery. There were 3026 volunteers from A. in the Mexican war. A. entered very zealously into the secession movement, and early in December, 1860, urged the southern states to withdraw from the union. A convention was held at Montgomery in Jan., 1861, to decide the question for the state itself, and the ordinance submitted on the 10th was adopted on the 11th by a vote of 61 to 39—the protesting minority representing the northern part of the state, where the whig party had been especially strong. Forts Gaines and Morgan, at the entrance to Mobile Bay, were seized

AREA AND POPULATION OF ALABAMA BY COUNTIES.

(ELEVENTH CENSUS : 1890.)

	Area in Square Miles.	Population.		Area in Square Miles.	Population.
Autauga.....	660	13,330	Jackson.....	1,144	28,026
Baldwin.....	1,620	8,941	Jefferson.....	1,092	88,501
Barbour.....	888	34,898	Lamar.....	612	14,187
Bibb.....	625	13,824	Lauderdale.....	682	23,739
Blount.....	752	21,927	Lawrence.....	768	20,725
Bullock.....	640	27,063	Lee.....	610	28,694
Butler.....	782	21,641	Limestone.....	596	21,201
Calhoun.....	640	33,835	Lowndes.....	720	31,550
Chambers.....	600	26,319	Macon.....	622	18,439
Cherokee.....	586	20,459	Madison.....	796	38,119
Chilton.....	710	14,549	Marengo.....	960	33,095
Choctaw.....	916	17,526	Marion.....	796	11,347
Clarke.....	1,160	22,624	Marshall.....	580	18,935
Clay.....	599	15,765	Mobile.....	1,234	51,587
Cleburne.....	545	13,218	Monroe.....	990	18,990
Coffee.....	728	12,170	Montgomery....	772	56,172
Colbert.....	556	20,189	Morgan.....	686	24,089
Conecut.....	804	14,594	Perry.....	774	29,332
Coosa.....	684	15,906	Pickens.....	934	22,470
Covington.....	994	7,536	Pike.....	710	24,423
Crenshaw.....	640	15,425	Randolph.....	599	17,219
Cullman.....	577	13,439	Russell.....	670	24,093
Dale.....	660	17,225	St. Clair.....	648	17,353
Dallas.....	954	49,350	Shelby.....	772	20,886
De Kalb.....	760	21,106	Sumter.....	970	29,574
Elmore.....	652	21,732	Talladega.....	784	29,346
Escambia.....	972	8,666	Tallapoosa.....	795	25,460
Etowah.....	510	21,926	Tuscaloosa.....	1,346	30,352
Fayette.....	700	12,823	Walker.....	824	16,078
Franklin.....	620	10,681	Washington....	1,050	7,935
Geneva.....	640	10,690	Wilcox.....	940	30,816
Greene.....	544	22,007	Winston.....	630	6,552
Hale.....	732	27,501			
Henry.....	984	24,847	Total.....	51,540	1,513,017





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by the governor, Jan. 3, 4, and on Jan. 21 the senators and representatives withdrew from congress. Delegates from the seceded states met at Montgomery, Feb. 4, and organized the confederate government. The constitution adopted then was ratified March 13 by a state convention, the vote being 87 to 6. A confederate arsenal, foundry, and navy-yard were soon established at Selma. In 1862, Feb.-April, federal troops occupied the Tennessee valley. In 1864, Aug. 6-23, Rear-admiral Farragut destroyed a confederate fleet in Mobile harbor and, aided by Gen. Granger with a land force, reduced forts Gaines and Morgan. In the spring of 1865, a body of troops under Maj.-gen. J. H. Wilson moved toward Mobile from the north, while a military and naval force under Maj.-gen. Canby and Rear-admiral Thatcher advanced from New Orleans. Selma was taken April 2; Tuscaloosa on the 3d; the forts about Mobile on the 8th and 9th; Montgomery was occupied on the 11th and Mobile on the 12th. The military departments of Alabama, Mississippi, and East Florida were surrendered to Gen. Canby, Mar. 4. A provisional government was established June 21, and in Sept. a convention of delegates, who had taken the oath of amnesty, repealed the act of secession and altered the constitution. In Nov. state officers and members of congress were chosen, and in Dec., U. S. senators; but congress, in conflict with President Johnson, refused admission to the representatives from Alabama. In 1867, April 1, by the reconstruction act, Alabama was included with Georgia and Florida in the third military district, under Gen. Pope. In Nov. a new constitution was framed, and received, Feb., 1868, 70,182 votes out of 71,817 cast. The majority of registered voters took no action in the matter, but congress declared the constitution operative, and it continued in force till 1875. On July 14, 1868, military rule ceased, and on Nov. 16, 1870, the state ratified the 15th amendment to the federal constitution. During the war 122,000 men entered the confederate army, and 7545-4969 colored—the union army. The material progress of Alabama has been rapid, especially since 1880, and no state has a brighter future.

TOPOGRAPHY.—Alabama is generally described as consisting of four great divisions: the cereal, mineral, cotton, and timber belts. The first belt comprises 8 counties in the north, including the valley of the Tennessee; the second, 28 counties, mainly between parallels $34^{\circ} 15'$ and $32^{\circ} 15'$; the third, 17 counties, reaching a little below parallel 32° ; the fourth, the 15 remaining counties. The greater part of the state of Alabama is an irregular plain less than 600 ft. in altitude, and with a general slope toward the southwest. Low spurs and isolated peaks, none over 2500 ft. high, occupy the northeast corner, and, with the gradually diminishing foot-hills that extend into the central counties, end the great Appalachian range. The surface is undulating almost to the sea-coast, and in many places in Baldwin and Mobile counties has an elevation of from 100-300 ft. The valleys, the most important of which are the Tennessee, Warrior, and Coosa, have a northeast and southwest direction. The coast line is only 60 miles in length. Among the bays are Grand, Bon Secours, Perdido (q.v.), and Mobile (q.v.), the last the only important one. The Tennessee river comes in at the northeast corner of Alabama, flows for 130 miles across the state, and passes out of the northwest corner, forming for a few miles the boundary with Mississippi. The Tombigbee enters from Mississippi, receives the Black Warrior, and, joining the Alabama above Mobile, forms the Mobile river, emptying into Mobile bay. The Alabama (q.v.), with its tributaries, drains all the middle part of the state. The Chattahoochee, forming the boundary with southwest Georgia, passes through Florida to the gulf. The Perdido, forming part of the boundary with Florida, rises in Alabama, as do the Choctawatchie, Yellow Water, Escambia, other Florida streams. All the rivers south of the Tennessee have a southwest and southerly direction, and are rapid as a rule. The navigable mileage is 2000 miles. Navigation on the Tennessee is aided by a canal around the muscle shoals, a series of rapids. Among mineral springs are those at Shelby, Blount, Livingstone, Bladen, and Tallahatta.

GEOLOGY.—The stratified rocks represent every formation occurring in the Appalachian region of North America. There are three geological divisions of Alabama, namely: the northern, containing most of the state north and west of a line from Chattanooga through Birmingham nearly to Tuscaloosa, and including the great Tennessee valley, in which the rock masses belong to the sub-carboniferous (calcareous and silicious limestones) and the coal measures; their strata approximately horizontal. Adjoining this is the middle region, bounded by a line drawn from the northeast corner to Tuscaloosa and thence through Centreville, Clanton, and Wetumpka to Columbus, Ga. This includes (1) the metamorphic region, with altered and crystalline sediments of Silurian or preceding ages; quartzites, marbles, granites, and gneisses, the strata in many places disintegrated into masses of stratified clay and interlaminated with quartz seams. (2) The Coosa valley, with prevailing calcareous rocks. (3) The Coosa and Cahawba coal fields, their strata consisting of sandstones, conglomerates, shales, and coal beds, tilted and unequally degraded. This division contains some of the highest land in the state. The southern division south and west of these limits, and including the cotton belt, consists largely of drift beds irregularly stratified over the eroded surface of cretaceous and tertiary rocks. Clark county, between the Alabama and Tombigbee, is rich in fossil remains.

MINERALOGY.—The southern limit of the mineral region may be defined by a line passing through Pikeville, Tuscaloosa, and Wetumpka to Columbus, Ga. Within this

area are the gold deposits of Randolph county, and three fields of bituminous coal, named from the rivers that drain them—the Warrior, covering 7800 square miles; the Cahawba, 200; and the Coosa, 150 square miles. Cannel, free-burning, lump, coking, gas, and other coals of superior quality are found. There are extensive beds of iron ore, including red hematite, limonite, black band, drift, magnetic and specular; and the Choccolocco, Anniston, Coosa, Cahawba, Birmingham, and other valleys are noted for their productiveness. Among other mineral products are asbestos, asphalt, copper, corundum, emery, fire-clay, graphite, granite, lithographic stone, manganese, white and variegated marble, marl, red ochre, phosphates, plumbago, pottery and porcelain clays, salt (in the southwest), silver, slate, soapstone, and tin. Natural gas has been discovered.

ZOOLOGY.—Among the wild animals, which are especially numerous in the north, are the bear, wolf, wildcat, fox, deer, opossum, raccoon, marsh-hare, skunk, cotton-rat, musk-rat, and squirrel. Among birds and wild fowl, the turkey, partridge, pigeon, rice-bird, mocking-bird, carrion-crow, ibis, spoonbill, flamingo, pelican, and cormorant. Alligators and moccasin snakes are found in the southern swamps, and terrapin in the salt marshes.

BOTANY.—In the mountain region the principal trees and shrubs are the red, black, and Spanish oak, mountain and short-leaved pine, red cedar, chestnut, butternut, elm, black walnut, hickory, poplar, linden, magnolia, and azalea. In the central or upper pine region they are the long-leaved pine, spruce, white cedar, red, black, water, swamp, post, and Spanish oak, maple, shell-bark, hickory, elm, sycamore, chinquapin, buckeye, haw, and redplum. In the southern counties, particularly in the coast pine-belt, are found the red cypress, pitch, and long-leaved pine, juniper; water, live, willow, and black-jack oak, tupelo, cotton-wood, catalpa, ash, elm, hickory, papaw, holly, palmetto, sweet-bay, black gum, snowdrop tree, huckleberry, wax myrtle, yaupon, yucca, and cane. Among flowering plants are the jessamine, wistaria, pipe-vine, rosin-weed, phlox, catchfly, bloodroot, pogonia, and 5 species of pitcher plant. There are over 150 species of native and naturalized grasses.

SOIL AND CLIMATE.—The valley of the Tennessee has chiefly a deep red calcareous soil; that in the metamorphic region is a red or gray loam with clay subsoil; in the coal measures it is sandy, with sand or clay subsoil; the north and middle divisions are bordered by a wide belt of red or yellow loam over stratified rocks and pebbles; the cotton belt has a heavy black calcareous soil from 2–20 feet deep, and south of this, brown and red clay loams predominate. In the extreme Southern counties the soil is light and sandy. Excepting the lowland along the rivers, the state is very healthful, particularly in the north. Extremes of temperature are rare, the yearly mean for the state being 61°. The summer heat is tempered by winds from the gulf; the average rainfall is 55.04". Snow falls occasionally in Jan. and Feb., but rarely in the south; the frost limits at Montgomery are Oct. 10 and April 25. The prevailing winds for the whole year are from the south and southwest.

AGRICULTURE.—The state may be divided into four natural sections, of which three are more or less adapted to agricultural purposes. The cereal belt includes the Alabama section of the Tennessee valley, is 200 miles long by 20 wide, covers eight counties, and has 180,000 inhabitants. Wheat, oats, rye, hay, cotton, and various fruits grow to advantage here, where the surrounding mountains provide a welcome shelter against the harsh winds of the north and the heat of the south. The agricultural region proper is known as the black belt, owing to the prevailing rich soil of rotten limestone. It extends some 70 miles across the state, between parallels 33° and 31° 40'. Water is obtained largely from artesian wells. The finest cotton is raised in this section, which embraces 17 counties and has 500,000 inhabitants, including a large percentage of negroes. The timber belt in the south contains superb forests of yellow pine, cypress, sweet bay, water-oaks and live oaks, and also yields sugar-cane, sorghum, melons, and peanuts in abundance. Chestnuts, cedars, mulberries, elms, hickories and poplars are found in the northern and central parts of the state. The mineral belt covers the southwestern terminal of the Appalachian range in the north. Large quantities of rice are raised in the sandy lowlands and river bottoms of the South. Ramie is likewise an important product, and tobacco is grown in the north. The vicinity of Mobile bay is extremely fertile, and yields such fruits as melons, plums, apricots, figs, pomegranates, olives, and oranges, besides peaches in several fine varieties. Good grazing lands are found among the northern hills, as well as in the more fertile districts of the south. Wild cane, mast, and numerous species of grass furnish desirable forage.

Cotton forms by far the largest crop. In 1891 Alabama ranked as the fourth state in cotton production and eighth in corn. Otherwise the staple products are wheat, oats, rye, potatoes, rice, tobacco, fruits, hay, wool, butter, cane, and honey.

The number of farms in 1890 was 275,000, with an acreage of over 19,000,000. The capital invested in lands and buildings approximated \$80,000,000. The principal crops (1896) were: Corn, 32,445,075 bush.; wheat, 394,184 bush.; oats, 4,454,870 bush.; potatoes, 438,976 bush.; rye, 16,152 bush.; hay, 92,385 tons; tobacco, 1,009,090 lbs.; and cotton (1895) 1,000,000 bales. The farm animals in 1895 comprised 128,336 horses, 127,195 mules, 308,439 milch cows, 523,329 other cattle, 271,111 sheep, and 1,848,898 swine, of a total value of \$24,686,936. Farming in Alabama has not yet recovered from the effects of the war, when 1,000,000 acres were allowed to relapse into wilderness, and the product was

reduced by one-half. That of 1860 has never been reached since. Latterly, however, many improved methods have been adopted, and increased attention paid to stock-raising.

INDUSTRIES.—Alabama's large and increasing manufacturing industries are mainly established in the flourishing and more recent cities of the North. She may be said to rival Georgia in her facilities for economic production, particularly of iron, as ore, coal, and limestone are frequently found close together. Unsurpassed water-power is afforded by means of the numerous falls and rapids of the Coosa, Tallapoosa, Chattahoochee and tributary streams. The largest cotton-mills are stationed at Tallassee. Lumber, iron, steel, machinery, cotton goods, flouring-mill products, wagons, bricks, and leather are the leading manufactures. The first practicable blast furnace was erected in 1852. Since then iron industries have taken gigantic strides, and become of paramount importance. The now thriving town of Bessemer, for instance, which was founded only in 1887, within three years could boast of seven furnaces, rolling-mills, fire-brick works, besides eight churches, public buildings, business blocks, and two newspapers. The same thing might be said of such centres as Anniston, Birmingham, Colera, Decatur, Florence, Sheffield, and Tuscaloosa. From 250 to 300,000,000 ft. of lumber are sawed annually from the splendid yellow pine and cypress forests of the state, while vast numbers of shingles, staves, etc., are manufactured. The yield of turpentine and rosin reaches large proportions, and of late the canning of fruit and vegetables has become a successful industry. In 1895, Alabama ranked fifth in production of coal with an output of 5,693,775 tons, value \$5,126,822; third in iron ore, output 2,199,390 tons; fourth in pig iron, output 854,667 tons; and second in coke, output 1,444,339 tons, value \$3,033,521. There were 26 cotton mills, with 164,898 spindles, 2,756 looms, and 517 cards.

COMMERCE.—Mobile is the only seaport, and the chief exports are cotton, coal, and lumber. The bay of Mobile is 30 miles long, and has an artificial channel for vessels drawing under 20 feet of water. In the calendar year 1896, the value of imports was \$860,411; exports, \$9,087,076; total trade, \$9,947,487; increase over 1895, \$2,685,564, exclusive of gold and silver coin and bullion. The principal imports were fruit and nuts; exports, cotton and lumber. Commerce increases very slowly, owing to railroad competition and discrimination. New Orleans takes the bulk of the cotton for export trade, and Pensacola the lumber.

RAILWAYS.—In 1892 there were 3595 miles of railroad against 2500 in 1887 and 853 in 1868. The leading roads, with mileage in state at the close of 1890, were the Alabama, Great Southern (Chattanooga to Meridian), 245 miles; Southern and Northern (Montgomery to Decatur), 189; Mobile and Montgomery, 178; Selma Division of East Tennessee, Virginia and Georgia, 172; Georgia Pacific, 241; Memphis and Charleston, 151; Savannah and Western, 156; Alabama Mineral, 127; and Kansas City, Memphis, and Birmingham, 118. In addition to the above there were 25 roads of less than 100 miles. The total mileage in 1896 exceeded 3,400, and the various roads represented a total investment of over \$114,500,000; cost for construction and equipment nearly \$103,000,000; had total funded debt of over \$57,000,000; net earnings over \$4,250,000; and paid interest and dividends of over \$3,000,000.

BANKS AND INSURANCE.—In 1896 there were 27 national banks, with aggregate capital of \$3,405,000; deposits, \$5,660,282; reserve, \$1,896,072; 10 state banks, with capital \$464,000; deposits, \$538,709; and 3 private banks, capital, \$137,000; deposits, \$508,272.

EDUCATION, LIBRARIES, ETC.—In 1895 Alabama had 9 universities and colleges of liberal arts, of which 3 were for males only, and 6 were co-educational. Combined, these institutions had 95 instructors, 1,558 students in all departments, grounds and buildings valued at \$880,500, productive funds \$365,000, income \$106,625, and volumes in libraries, 37,000. These institutions were Blount College, Blountsville; St. Bernard College, Cullman; Howard College, East Lake; Southern University, Greensboro; Lafayette College, Lafayette; Lineville College, Lineville; Selma University, Selma; Spring Hill College, Spring Hill; and the University of Alabama, University Station. There were an agricultural and mechanical college for white students at Auburn, and a normal and industrial school for the colored at Normal. The number of children of school age (1894) was 603,000, of whom 306,014 were enrolled in the public schools, and 185,100 were in daily attendance. There were 6,687 school buildings, 6,608 teachers, and school property valued at \$1,373,000, and the expenditure of the year was \$663,359. For secondary instruction there were 51 public high schools, with 109 teachers and 2,593 secondary students, and 79 private schools, with 181 teachers and 3,304 secondary students. Six public normal schools had 65 teachers and 1,498 students, and 5 private normal schools, 105 teachers and 1,454 students. There were also 8 colleges for women, 2 schools of theology, 2 of medicine, and one each of law, dentistry, and technology. The state had 27 public libraries of over 1,000 volumes each in 1893, with a total of 100,216 bound volumes and 22,121 pamphlets. In 1896 there were 212 periodicals, including 20 dailies.

GOVERNMENT.—The capital is Montgomery. A residence of one year in the state, three months in the county and 30 days in the township or precinct entitles an adult to vote. State senators and representatives receive \$4 per day and 10 cents per mile traveled. The former (33) serve four years; the latter (100) two. The legislature meets biennially. The governor (elected for two years) receives a salary of \$3000; the treasurer, \$2100; the secretary of state and the auditor, \$1800 each; the attorney-general, \$2500. The judiciary consists of a chief-justice and four associate justices of the supreme court, serving six years; 10 district judges of circuit courts, serving for the same time; 5 chancellors of the court of chancery, and judges of the probate and city courts. The last-named are appointed by the governor, but all other judicial offices are filled by pop-

ular vote. The U. S. district courts are at Montgomery, Mobile, and Birmingham. The legal rate of interest is eight per cent, with forfeiture in case of usury.

Alabama has two senators and nine representatives in the U. S. congress. The electoral votes have been cast as follows: 1820, Monroe and Tompkins, 3; 1824, Jackson and Van Buren, 5; 1828, Jackson and Calhoun, 5; 1832, Jackson and Van Buren, 7; 1836, Van Buren and Johnson, 7; 1840, for same; 1844, Polk and Dallas, 9; 1848, Cass and Butler, 9; 1852, Pierce and King, 9; 1856, Buchanan and Breckenridge, 9; 1860, Breckenridge and Lane, 9; 1864, no vote; 1868, Grant and Colfax, 8; 1872, Grant and Wilson, 10; 1876, Tilden and Hendricks, 10; 1880, Hancock and English, 10; 1884, Cleveland and Hendricks, 10; 1888, Cleveland and Thurman, 10; 1892, Cleveland and Stevenson, 11; 1896, Bryan and Sewall, 11.

FINANCES.—The state receipts for year ending Sept. 30, 1896, were \$1,999,930; expenditures, \$1,959,977. The amount raised by taxes was \$1,328,817. The assessed value of property in 1895 was \$241,338,024; bonded debt, \$9,299,400; current rate of taxation, 5 mills. The total debt, less sinking fund, in 1890, was \$18,930,867.

CHARITIES, ETC.—The state institutions comprise the Alabama Institution for the Deaf, the Alabama School for Negro Deaf Mutes and Blind, and the Alabama Academy for the Blind, all at Talladega; a hospital for the insane, at Tuscaloosa; a penitentiary, at Wetumpka; and two prisons at Pratt Mines. The convict system has undergone radical improvements, but prisoners are still leased to contractors for various kinds of work.

POPULATION.—In 1820, 127,901—41,879 slave, 571 free col'd; 1840, 590,756—253,532 slave, 2039 free; 1860, 964,201—435,080 slave, 2690 free; 1880, 1,262,505—600,103 col'd; 213 Indian; foreign born, 9734—2966 Irish; males, 622,629; females, 639,876; persons to square mile, 24.50; whole number of dwellings, 240,227; families, 248,961; engaged in agriculture, 380,630; in manufacturing, mining, and mechanical industries, 22,996; population 1890, 1,513,017; 1893, 1,625,000. There are 66 counties; for population 1890, see census tables, vol. XV. The largest towns, 1890, were: Mobile, 31,076; Birmingham, 26,178; Montgomery, 21,883; Anniston, 9876.

ALABAMA, a river of the state of A., is formed by the junction of the Coosa and Tallapoosa, about 10 m. n.e. of Montgomery. Its general course is westward to Selma, thence s. westward until about 50 m. n. of Mobile, where it meets the Tombigbee, and with that stream forms the Mobile river. Its whole course is tortuous; its length about 320 m.

ALABAMA, THE, an armed vessel of the Confederate States of America, which inflicted terrible injury upon the shipping of the northern states of the American Union during the civil war which broke out in 1861. The career of the A. was in more than one respect unparalleled in the history of any previous naval war. She was, for a war-ship, a small vessel, built for speed, carrying a few guns, and intended not for fighting, but for preying upon defenseless merchant-ships. She was almost the only vessel the Confederate states had upon the open seas; but the destruction she wrought was so great, and in effect so alarming, as to produce a very marked diminution in the number of commercial vessels carrying the flag of the United States. She was built, too, in a British port, and never, at any time, entered a port of the state by which she was commissioned: there was no port available for the disposal of her prizes, and, ship and cargo, they were usually burned. Her career demonstrated how completely, in the present state of commerce, under the conditions of navigation and naval warfare produced by steam and long-range artillery, belligerents fairly matched might ruin each other at sea; and it raised international questions between the United States and Great Britain, which more than once threatened to issue in the gravest consequences to both nations.

At the outbreak of the war, the Confederate states were without a navy, and apparently without the means of acquiring one, for their population was agricultural; they had neither ships nor seamen; and the northern states promptly instituted an effective blockade of nearly all their ports. The able men who had planned the secession of the southern states from the American Union had not overlooked the subject of a navy; but events had been against them. They had reckoned upon securing a part of the United States fleet; and before the war commenced, they had determined upon fitting out some small and swift vessels, carrying a few heavy guns, to cruise against the northern commerce. A majority of the senior naval officers of the United States were southern men, and were at their command; but although efforts had been made early in 1861 to purchase ships for the south, it was not until several months after the war began, in June, 1861, that the Confederate states were able to send their first armed cruiser to sea. This was the *Sumter*, a small steamer which had previously traded between New Orleans and Havana. Capt. Raphael Semmes, who was appointed her commander, was a native of Maryland, about 51 years of age, and had been a commander in the U. S. navy. His career in the *Sumter* is a record of triumphs won over neutral governors and ministers, who were disinclined to admit the little *Sumter* to the position of a belligerent war-vessel; of clever avoidance of the enemy's cruisers, of which several were always on his track; and of the destruction of valuable ships and cargoes belonging to citizens of the United States. The *Sumter* and her captain were soon known throughout the world.

Though called a pirate, Semmes appears to have done nothing but what it was his right as a belligerent to do. It was upon his system of burning his captures, not upon the captures themselves, that the people of the northern states founded their charge; and his treatment, warranted by precedents, was probably within his right. The cruise of

the *Sumter*, which began on the 30th June, 1861, with her escape from New Orleans, then strictly blockaded, was over before the end of the year; but she had captured 18 vessels, had spread alarm through the northern sea-ports, and had put ship-owners and merchants to heavy charges for insurance; and by disinclining merchants to ship their goods in northern vessels, had seriously injured the shipping trade of the northern states. Eventually, she was laid up at Gibraltar, and declared unfit for further service: had she been seaworthy, it would have been very difficult to carry her out of a port where she was diligently watched by northern cruisers. She had, however, verified the anticipations of the Confederate government; and in 1862, this government found a successor for her, much better fitted for the work to be done, and destined to far greater celebrity. This was the *Alabama*, built for the Confederate government by Messrs. Laird and Sons, at Birkenhead, England. She was a screw steam-sloop of 1040 tons register, built of wood, and for speed rather than strength. She was bark rigged, with two 350 horse-power engines, was pierced for twelve guns, and had the means of carrying two heavy pivot-guns amidships. She cost \$237,500 without equipments; including equipments, \$258,580. In June, 1862, Semmes was appointed to superintend her equipment, and to take command of her when completed, but enjoined to keep her destination as much of a secret as possible. Before he sailed, however, the British government was called upon by the U. S. minister to detain the "No. 290," as she was called, from her number in the list of steamships built by the Messrs. Laird, on the ground that her construction being more that of a war vessel than an ordinary trading vessel, in itself constituted grounds for seizure, as being an infringement of international law. Before any decision was arrived at (July 31st, 1862), "No. 290," under pretense of making a trial trip, steamed away from the British coast, whereupon the British government was notified that it would be held responsible for any damage the vessel might do to American commerce. In the mean time the vessel arrived at Terceira, one of the Azores, Aug. 13th, and was joined, a few days later, by the *Agrippina*, of London, with her guns, stores, and supply of coal, and by the *Bahama*, with Capt. Semmes and his officers. By Aug. 24th she was ready for sea, and Capt. Semmes produced his commission to the sailors, named her the *Alabama*, and hoisted the Confederate flag. The sailors on the three vessels were Englishmen, all entered for a feigned voyage, and with few exceptions they enlisted under Capt. Semmes. The crew consisted of eighty men all told, and the armament of eight 32-pounders. The *Alabama* made her first capture Sept. 5th, and within eleven days she seized and burned property the value of which exceeded her own cost. The people of the United States were filled with indignation and alarm, and several fast-sailing cruisers were at once sent in search of her. As Semmes was anxious to make some captures within sight of New York, he sailed at once for the American coast; but his supply of coal failing, he had to make for a coaling station, after which he lay in wait for the California mail-steamers, plying between New York and Aspinwall. After a time he captured the *Ariel*, taking one gun and a quantity of specie, besides several United States officers, 140 marines, and about 500 other passengers. There was not room on the *Alabama* for the passengers and crew, and as the yellow fever was raging at Kingston, Jamaica, where he intended to land them, he was unable to destroy the steamer, as he intended, but set her free after exacting a bond for a large sum to be paid at the close of the war. This capture caused great alarm among ship owners, which was further increased, Jan. 17th, 1863, by an encounter between the *Alabama* and the United States gunboat *Hatteras*, off Galveston, Texas, in which the latter was sunk. After this pursuit became so hot that she sailed away for the African coast and remained until June, 1864, when she returned to European waters, and put in to Cherbourg, on the coast of France, for repairs and supplies. A few days later the United States steamer *Kearsarge* arrived off Cherbourg, and made demonstrations that were regarded by Capt. Semmes and his officers as a challenge. Accordingly, on June 19th, he put out to sea some three leagues, or beyond French waters, where, after an hour's battle Semmes found his ship sinking, and gave orders to pull down his flag, to get out the boats and put the wounded into them; but before this could be done the ship went to the bottom. The boats of the *Kearsarge* saved many of the crew; others, including Capt. Semmes, were picked up by the *Deerhound*, an English yacht that had gone out to see the fight, and had been allowed by Capt. Winslow to assist in the rescue. These the *Deerhound* immediately carried within the neutral jurisdiction. Semmes and the others saved by this vessel were afterwards charged with having broken their faith as prisoners who had asked for quarter from the *Kearsarge*; but this is not so, because when once on the deck of the *Deerhound* they were entitled to the protection of Great Britain, and no previous compact could have deprived them of it. The *Alabama* captured in all sixty-five vessels, most of them merchant vessels incapable of resistance, which she either burned or liberated on bond, and the value of the property she destroyed in this way has been estimated at \$4,000,000. But it was by the heavy insurance for war risks to which she subjected them, and still more by the difficulty she caused them in getting freights that the *Alabama* inflicted the greatest injury upon the ship owners of the United States. See *The Cruise of the Alabama and the Sumter*, compiled from the papers of Capt. Semmes.

The "Alabama Question" was fairly raised in the winter of 1862-63, when Mr. Seward, in his diplomatic correspondence, declared that the Union held itself entitled at a suitable time to demand full compensation for the damages inflicted on American property by Anglo-confederate vessels; the question never ceasing to be a source of irritation

between the two peoples till its final settlement by special tribunal of arbitration. This court, consisting of the representatives of England and the United States, and of three other members appointed by the king of Italy, the president of the Swiss confederation, and the emperor of Brazil, met at Geneva, 17th Dec., 1871, and, the claim for indirect damages to American commerce having been allowed to drop, finally decreed, 15th Sept., 1872, that Great Britain should pay \$15,500,000. See GENEVA ARBITRATION.

AL'ABASTER. This name is given to two kinds of white stone, chemically distinct, but resembling each other in appearance, and both used for ornamental purposes. A. proper is a white, granular, semi-transparent variety of gypsum (g.v.), or *sulphate* of lime. It occurs in various countries, but the finest is found near Volterra, in Tuscany, where it is worked into a variety of the smaller objects of sculpture, vases, time-piece stands, etc. Gypseous A. of good quality is also found in Derbyshire, and many ornamental articles are made of it at Matlock and other places. Not being quite insoluble in water, it cannot be exposed to the weather; and its softness makes the surface easily become rough and opaque. Nor is it generally found in sufficient masses for large works. The other stone is a compact, crystalline *carbonate* of lime deposited from water in the form of stalagmite, etc. It is distinguishable from the gypseous alabaster by its effervescing with an acid, and by its hardness; real alabaster may be scratched with the nail.—The name is derived from Alabastron, a town in upper Egypt, where this kind of stone was abundant, and was manufactured into pots for perfumes. Such pots were called *alabastrine*, even when made of other materials.

AL'ABASTER, WILLIAM, D.D., 1567-1640, an English poet and scholar. He was educated at Cambridge and Oxford, and was a fellow of Trinity college. He was appointed chaplain to Robert, earl of Essex, whom he accompanied in 1591 in the expedition intended to assist Henry IV. against the league. In France he was converted to the Roman Catholic church, but did not long remain in it. His report was that he was enticed to Rome and imprisoned, but escaped. Returning to England he became prebendary of St. Paul's and rector of Hatfield. A. was a famous Hebrew scholar, with a strong inclination to mysticism in tracing the meaning of scripture. Dr. A. published several works on scriptural subjects, and left a number of poems in MSS., one of which was surreptitiously published—a tragedy called *Roxana*, which Dr. Johnson regarded as the only Latin verse of English production worth naming until Milton appeared.

ALACH'UA, a co. in n. Florida, between the Santa Fé and Suwannee rivers, crossed by several railroads; 1282 sq. m.; pop. '90, 22,934, inclu. colored. It has a rolling surface and fertile soil, producing sea-island cotton, oranges, etc. Co. seat, Gainesville.

ALACOQUE, MARGUERITE MARIE, 1647-90; a French nun, who established the festival of the sacred heart of Jesus. She took the veil at Paray-le-Monial, where she is said to have performed miracles, prophesied, made revelations, and held direct communication with God and the angels. She foretold the day of her death, and cut the name of "Jesus Christ" on her bosom with a knife. By the Roman Catholic church she is called "venerable."

ALADAGH', a mountain chain in Asiatic Turkey in which the Euphrates rises. The chief portion of the chain is above the basin of the lake Van, between 39° and 40° n. and 42° and 44° e., forming part of the water-shed between the Caspian sea and the Persian gulf.

ALAGO'AS, a maritime province of Brazil, which formed at one time a district of the province of Pernambuco. It is bounded on the n. and w. by Pernambuco, and on the s. is divided from the province of Sergipe by the navigable river San Francisco. The country, which is mountainous in the n.w., and low, marshy, and unhealthy on the coast, contains (1890) 511,440 inhabitants.

ALAIN DE LILLE, 1114-1203; a Cistercian scholar, called "the universal doctor," one of the most learned men of the 12th c., in philosophy, theology, history, medicine, and poetry. He was appointed bishop, but soon resigned to enter a monastery. He wrote chiefly in verse on alchemy, natural philosophy, and doctrinal subjects. Germany, Scotland, Spain, Sicily, and Flanders contend for his birthplace; but he said he came from Lille in Flanders, as his name implies.

ALAIS, a t. of the dep. of Gard, France, situated in a fertile plain, on the right bank of the Gardon, at the base of the Cevennes mountains, 23 m. n.w. from Nîmes, with which it is connected by railway. It embraced the Protestant cause in the religious wars of France; and Louis XIII. in person, accompanied by the cardinal de Richelieu, besieged it, and having taken it in 1629, demolished its walls. Three years later, the baron of A. having taken part in the rebellion of Montmorency, the castle was destroyed. Protestantism still prevails to a considerable extent. A. is a very flourishing t., and owes its prosperity chiefly to the mineral wealth of the surrounding district, which produces coal, iron, lead, zinc, and manganese. The coal and iron mines are of chief importance. Pop. 23,700.

ALAJUE'LA, a city of the state of Costa Rica, Central America, 23 m. w.n.w. from Cartago, and a little on the western side of the water-shed between the Atlantic and the Pacific. It contains many good houses, and has extensive suburbs of detached houses,

embowered among trees and flowering shrubs. The neighborhood is chiefly devoted to the culture of the sugar-cane. Population about 10,000.

ALAMANCE, a co. in North Carolina, on the Haw river and the Southern railroad; 446 sq. m.; pop. '90, 18,271, inclu. colored. It has an undulating surface and fertile soil, producing tobacco, corn, etc. Co. seat, Graham.

ALAMAN NI, LUIGI, a distinguished Italian poet, b. at Florence, Oct. 28, 1495. His father, a man of noble birth, was a zealous partisan of the Medici, and Luigi stood high in their favor till in revenge for some real or fancied wrong he conspired against the life of cardinal Giuliano, the representative of Leo X. This being found out, A. fled to Venice, and thence, on the accession of the cardinal to the papal chair, to France. In 1527, encouraged by the pope's reverses, he returned to Florence, and urged the republic to seek the protection of Charles V., by means of Andrea Doria's friendly mediation. The republic declared such a proposal treachery, and A. sailed with Doria for Spain. Finally, he settled in France, employed as a diplomatist by Francis I. and Henry II. A. d. at Amboise in 1536. He wrote epics, dramas, and minor poems, much admired in their day, and disputes with Trissino the claim of first introducing blank verse into Italian poetry.

ALAMEDA, a co. in w. California, on the bay of San Francisco, and traversed by several railroads; 704 sq. m.; pop. '90, 93,864, with Chinese; co. seat, Oakland.

ALAMEDA, a city in Alameda co., Cal., 6 miles across the bay from San Francisco, with which it is connected by ferry lines; on the Central Pacific and South Pacific Coast railroads. It is mainly a residential city for San Francisco business men, has macadamized streets, an improved sewer system, electric lights, an electric railroad, public and private schools, a free library, good banking facilities and newspapers, and is celebrated for its cleanliness and for its variety of trees. Its new city hall was completed in 1897. The drawbridge over the Oakland estuary has a draw of 380 feet. Borax is manufactured on an extensive scale, and there are manufactures of sewer pipe, pottery, and a large oil refinery. Pop. 1890, 11,165.

A'LAMO, THE, a fort now in San Antonio, Bexar co., Texas, famous in the Texan war of independence. It was oblong, covering about $2\frac{1}{2}$ acres, with walls some 22 ft. high, and a yard in thickness. Here, Feb. 23, 1836, Santa Anna with 4000 Mexicans shut in 151 Texans and men from the United States commanded by Col. Wm. B. Travis. Bombardment was kept up 24 hours, and several assaults were repulsed; Travis sent for help, but only 32 men reached him, and all his men suffered greatly from fatigue and want of provisions. On the 6th of Mar. at daylight the Mexicans assaulted in force, and were twice driven back with heavy loss. A hand to hand fight ensued, in which, lacking time to load, the Texans clubbed their rifles and fought desperately until only six were alive. These, including Colonels Crockett and Travis, surrendered under promise of protection, but were killed by Santa Anna's orders. Col. Bowie, ill in bed, was shot after killing a number of his assailants, and Maj. Evans was shot while trying to fire the magazine. Some women, a negro, and one child alone were spared. Then the bodies were collected, mutilated, and burned. A few weeks later Santa Anna was routed with immense loss and himself captured in the battle of San Jacinto, where the cry "Remember the Alamo" excited the Texans to fight like heroes.

A'LAMOS, Los (i.e., *The Poplars*), a t. of Mexico, in the state of Sonora, and department of Sinaloa, 110 m. n.n.w. from Sinaloa. It is situated in a barren plain, but in a region famous for its silver mines. The houses are mostly of stone or brick, covered with stucco. Provisions are dear, being brought from a distance, and the t. is very insufficiently supplied with water. Pop. estimated at 6000 to 10,000.

ALAN, ALLEN, or ALLYN, WILLIAM, 1532-94; an English cardinal. He studied in Oxford, and became principal of St. Mary's Hall in 1556. Two years later he was made canon of York. He opposed the reformation, and on the accession of Elizabeth fled to Louvain. After a while he returned to England, but his proselyting zeal made another flight necessary. He was given a doctor's degree by the new university of Douay, and established there a college for English Roman Catholics, whence he sent Jesuit priests to his native land, the aim of his life being to restore papal supremacy in England. In 1589 he was offered the archbishopric of Mechlin. He hated Elizabeth, who expelled some of his emissaries and put some to death. In one of his pamphlets he made charges against the queen too foul for decent pages. He was in the armada plot—the pope having promised him the see of Canterbury in case of success. He published 10 volumes, among them: *Certain brief Reasons concerning Catholic Faith* (1564); *The Execution of Justice in England* (1584); and aided in revising the English trans. of the Douay Bible.

A'LAND ISLANDS (pronounced Oland), a numerous group of small islands and rocks at the entrance of the gulf of Bothnia, opposite Abo, about 25 m. from the Swedish coast, and 15 from that of Finland. They are called, by the Finns, Ahvenanmaa. About 80 of them are inhabited. Although these rocky isles are covered with but a thin stratum of soil, they bear Scotch fir, spruce, and birch trees, and with proper cultivation produce barley and oats, besides affording subsistence to a hardy breed of cattle. The inhabitants are of Swedish origin, skillful sailors, fishermen, and seal-hunters. The total population is about 16,000. The largest of the islands, which gives its name (signifying "land of streams") to the whole group, is about 18 m. long by 14 broad. It is tolerably wooded and fruitful, and contains nearly 11,000 inhabitants. These islands belonged formerly to Sweden, but were seized by Russia in 1809. Previous to this, they had several times changed hands between these two powers. In 1717, the Swedes

were defeated by the Russians in a naval engagement near Aland, the first important exploit of the Muscovite navy. The importance of these islands as a military position led to the construction, in the reign of the emperor Nicholas, of those strong fortifications at Bomarsund which, in Aug., 1854, were destroyed by the Anglo-French force, commanded by Sir Charles Napier and Baraguay d'Hilliers. Two thousand prisoners were taken. This extensive fortress (which is supposed to have been but the first of an intended series of similar menacing fortifications in the Baltic) commanded the anchorage of Ytternæs, capable of containing a large fleet.

ALANGIA'CEÆ, a natural order of dicotyledonous plants, allied to *Myrtaceæ* (q.v.), and containing only about eight known species, trees and large shrubs, of which the greater number belong to the American genus *nyssa* (see TUPELO), differing from the rest of the order in the absence of petals. The one-celled fruit, and pendulous albuminous seeds, constitute marks of distinction from myrtaceæ. The fruit of *alangium decapetalum* and *A. hexapetalum*, natives of the East Indies, are eatable, but mucilaginous and insipid. The timber is good, the roots aromatic.

ALA'NI, nomadic tribes of eastern origin who spread over Europe during the decline of the Roman empire. They probably were first encountered by the Romans when Pompey, in the Mithridatic war, led an expedition into the Caucasus. In 276 A.D. they were checked by the emperor Tacitus in their attempt to go eastward into Persia. The Huns gave them a severe defeat on the Tanais in 375, and then the A. divided, some going e., but the larger portion joining their conquerors in an invasion upon the Goths. With the Vandals and Suevi they entered Gaul in 406, and later crossed the Pyrenees and founded settlements in Lusitania, where they lived for some time in peace. In 418 they were attacked by the Visigoths, their king was slain, and they became subject to Gunderic, king of the Vandals, losing completely their national independence. About 450 they served under Theodoric; but they sympathized with the barbarians, and their desertion at Chalons (451) came near bringing defeat upon the Roman army. They were mentioned occasionally in later times, and seem to have kept their independence after the 6th c. In 1221, Gengis Khan defeated them, and they were so completely subjugated in 1237 by Batu-Khan that their name disappeared from history.

AL-ARAF, in the Mohammedan religion, the line or wall of separation between heaven and hell, astride of which are placed those whose accounts of good and evil exactly balance, so that they deserve neither hell nor heaven; also those who went to war without consent of their parents, who are deemed martyrs, safe from hell but not quite worthy of heaven.

ALARCON, HERNANDO DE, a Spanish navigator of the 16th c., the first to visit the coast of California. He sailed May 9, 1540, to meet a land expedition under Vasques de Coronada, but did not find him. He discovered that lower California (a supposed island) was a peninsula, made a good survey of the coast, sailed up the Rio de Tizon (Colorado), and on returning to Mexico, in 1541, made a map of California, which differs little from those of the present day.

ALARCON Y MENDOZA, JUAN RUIZ DE, one of the most eminent of Spanish dramatists, b. at the t. of Tasco, in Mexico, about the end of the 16th c. He belonged to the ancient family of the Ruizes of Alarcon, of which a branch had emigrated to America. Having studied at the college that had been instituted in Mexico, he removed to Spain, where he is mentioned as *Relator del real consejo de las Indias* (reporter of the royal council of the Indies) in 1622. The success that early attended his pieces, joined to the haughty disdain with which, in the consciousness of his own powers, he treated the opinion both of the public and of his brother-writers, excited the envy and jealousy of his contemporaries, so that he became the object of venomous epigrams by the most famous poets of the time, in which the deformed upstart from New Spain, with his pride and contemptuousness, was held up to public ridicule. This kind of persecution continued till his death, which occurred in 1639. Even during his lifetime, his best pieces were attributed to others, and were printed and represented under the names of more favored poets. This early withdrawal and oblivion of his name, together with the scarcity of his works, have been the cause that he has seldom been mentioned and still less appreciated by historians of literature, even down to the latest times. Yet some of the best critics rank him next to Calderon and Lope de Vega as a dramatic writer. Besides many single or detached pieces printed in collections, he published a number in his *Comedias* (vol. i., Madrid, 1628; vol. ii., Barcelona, 1634). Hartzenbusch began a collected edition at Madrid, 1848. A. attempted almost all the kinds of drama in vogue in his time; and was especially eminent in the heroic, as the best specimens of which may be mentioned *El Tejedor de Segovia* and *Ganar Amigos*, or *La que mucho vale mucho chesta*. A.'s mastery in delineating character is shown in the *Comedias de Costumbres*, or character-comedies, of which he may be held as the creator. The best known are *La Verdad Sospechosa* (imitated by Corneille in his *Menteur*) and *Las Paredes Oyen* (Walls have Ears), which are yet represented on the Spanish stage. Of his comedies of intrigue, the best specimen is *Todo es ventura*. It does not appear that A. wrote any *Autos* or sacramental allegorical dramas, though his two pieces, *El Antichristo* and *Quien mal anda en mal acuba*, betray a tendency to ascetic mysticism. Although, through the artifices of his contemporaries, as well as the *éclat* of

Lope de Vega's and Calderon's dramas, the compositions of A. were soon driven from the stage, yet he remains, together with Tirso de Molina, the most distinguished and original among the successors of Lope. Lope and Calderon, the coryphæi of that age, are the only dramatists that excel A. Combining, in no mean degree, the characteristics of both, he excels them in purity of language and elevation of moral feeling.

ALARD, DELPHIN, violinist, born in Bayonne, France, March 8, 1815; died in Paris, Feb. 22, 1888. He was the son of an amateur violinist, studied in Paris under Habeneck and Fétis, and won the notice of Paganini, when he appeared in concerts. In 1840 Alard succeeded Baillot as first violinist to the king, and in 1843 became professor of the violin at the Paris Conservatoire. He is the representative of the modern French school of violin playing, has composed nocturnes, duos, études, etc., for the violin, and is the author of an *École du violin*, which was adopted by the Conservatoire.

AL'ARIC I. (*Al-ric*, i.e., all rich, or from *Al*, all, and *reiks*, ruler) a great chieftain of the Visigoths. He makes his first appearance in history in 394 A.D., as leader of the Gothic auxiliaries of Theodosius in his war with Eugenius; but after the death of the former, he took advantage of the dissensions and weakness that prevailed in the Roman empire to invade (395) Thrace, Macedon, Thessaly, and Illyria, devastating the country, and threatening Constantinople itself. Rufinus, the minister of Arcadius, appears to have sacrificed Greece in order to rescue the capital, and Athens was obliged to secure its own safety by ransom. A. proceeded to plunder and devastate the Peloponnesus, but was interrupted by the landing of Stilicho in Elis with the troops of the west. Stilicho endeavored to hem in the Goths on the Peneius; but A. broke through his lines, and escaped with his prisoners and booty to Illyria, of which he was appointed governor by the emperor Arcadius, who was frightened by his successes, and hoped, by conferring this dignity on him, to make him a peaceful subject instead of a lawless enemy (396). In 402, he invaded upper Italy, and Honorius, the emperor of the west, fled from Rome to the more strongly fortified Ravenna. On the way to Gaul, A. was met and defeated by Stilicho at Pollentia on the Tanaro; but it was not till the following autumn that the result of the battle of Verona forced him to retire into Illyria. Through the mediation of Stilicho, A. concluded a treaty with Honorius, according to which he was to advance into Epirus, and thence attack Arcadius in conjunction with the troops of Stilicho. The projected expedition did not take place, yet A. demanded indemnification for having undertaken it; and Honorius, by the advice of Stilicho, promised him 4000 pounds of gold. When, after the death of Stilicho (q.v.), Honorius failed to fulfill his promise, A. advanced with an army, and invested Rome, which he refused to leave till he had obtained the promise of 5000 pounds of gold and 30,000 of silver. But neither did this negotiation produce any satisfactory result, and A. again besieged Rome (409 A.D.). Famine soon rendered it necessary that some arrangement should be made; and in order to do it, the senate proclaimed Attalus, the prefect of the city, emperor instead of Honorius. But Attalus displayed so little discretion, that A. obliged him publicly to abdicate. The renewed negotiations with Honorius proved equally fruitless with the former, and A. was so irritated at a perfidious attempt to fall upon him by surprise at Ravenna, that he advanced on Rome for the third time. His victorious army entered the city on Aug. 24, 410, and continued to pillage it for 6 days, A. strictly forbidding his soldiers to dishonor women or destroy religious buildings. When A. quitted Rome, it was only to prosecute the conquest of Sicily; the occurrence of a storm, however, which his ill-constructed vessels were not able to resist, obliged him to abandon the project for the time; and his death, which took place at Cosenza, in Calabria, soon after (410), prevented his resuming it. In order that his remains might not be discovered by the Romans, they were deposited in the bed of the river Busento, and the captives who had been employed in the work were put to death. Rome and all Italy celebrated the death of A. with public festivities; and the world enjoyed a momentary repose. But A. himself was much less barbarous than his followers.

ALARIC II., 8th king of the west Goths, or Visigoths, succeeded his father in 484 A.D. He was of a peaceful disposition, and wished to live on friendly terms with the Franks. His dominions were very extensive. Besides Hispania Tarraconensis and Bætica, he possessed numerous rich provinces in Gaul, and formed an alliance, which still further increased his power, with Gondeband and Theodoric, the latter of whom was his father-in-law, and king of the east Goths. At length, however, he came into collision with the Frankish monarch, Clovis, whose cupidity had been excited by the extent and fertility of the territories over which A. ruled. An excuse was found for breaking the peace which existed between the two nations, in the fact that A. was a zealous Arian. This circumstance had given great offense to many of his subjects, who were orthodox Catholics; and ostensibly to vindicate the true doctrine, the newly converted barbarian, Clovis, declared war against him. The result was fatal to A. He was slain by the hand of Clovis himself at Vouillé, near Poitiers, and his forces completely routed.

A. is said to have been indolent and luxurious in his youth; but this may simply imply that he was not fond of those sanguinary pleasures which captivated his savage contemporaries. He was tolerant in his religious convictions. Though an Arian, he did not persecute the Catholics. He enacted several useful statutes, and kept a watchful eye on all parts of his kingdom. It was during his reign that the *Breviarium Alaricianum*, or code of A., was drawn up. It is a selection of imperial statutes and writings of the Roman juriconsults. A. sent copies of it to all his governors, ordering them to use it, and no other. An edition of it was published by Sichard, at Basle, in 1528.

ALARM'. In military matters, the word alarm has a more defined meaning than mere terror or fright. An alarm, among soldiers in an army, is not so much a danger, as a warning against danger. An alarm, signified by the firing of a gun or the beating of a drum, denotes to an army or camp that the enemy is suspected of intending a sudden surprise, or that the surprise has actually been made. There is an *alarm-post* in camp or garrison arrangements, to which the troops are directed to hasten on any sudden alarm being given.

ALARM, BURGLAR, consists of an electric bell and battery connected by wiring to every means of entrance to a building. The wiring is arranged so that opening any door or window closes the circuit through the bell and battery and rings the bell. The latter may be located in any part of a building, or in watchman's quarters outside the building. In addition to the bell an annunciator is generally used which shows by means of different drops from which entrance into the building the alarm has been given. A switch is provided by means of which the B. A. may be shut off when not needed, and when this switch is closed the alarm will ring if any door or window has been accidentally left open. Many city houses left temporarily vacant are connected directly to a police station, making it impossible to enter them without sending in an alarm at the station.

ALASCO, JOHN, 1499-1560 ; a Polish nobleman and traveler, who imbibed the doctrines of Zwingli, and had intercourse with Erasmus, who esteemed him highly, bequeathing to him his library. He first preached Protestantism in East Friesland, but, anticipating persecution, he went to London, on Cranmer's invitation, and became superintendent of the congregation of the foreign Protestant exiles. On the accession of Mary, in 1553, he and all his congregation were banished. In 1556, he returned to Poland, where he died. He wrote many treatises, and was one of the 18 divines who prepared the Polish version of the Bible.

ALA-SHEHR' (i.e., *the exalted city*, ancient *Philadelphia*), a city of Asia Minor, in the pashalic of Anatolia, 75 m. e. by s. from Smyrna, at the n.e. base of Mt. Tmolus. It was founded by Attalus Philadelphus, king of Pergamos, about 200 n.c., and is famous as the seat of one of the "seven churches of Asia." It is still a place of considerable importance, and carries on a thriving trade by caravans, chiefly with Smyrna. It is surrounded by a wall, and is of large extent; but the streets are narrow and dirty. There are many interesting remains of antiquity. Pop. about 15,000, of whom a considerable number are Greeks.

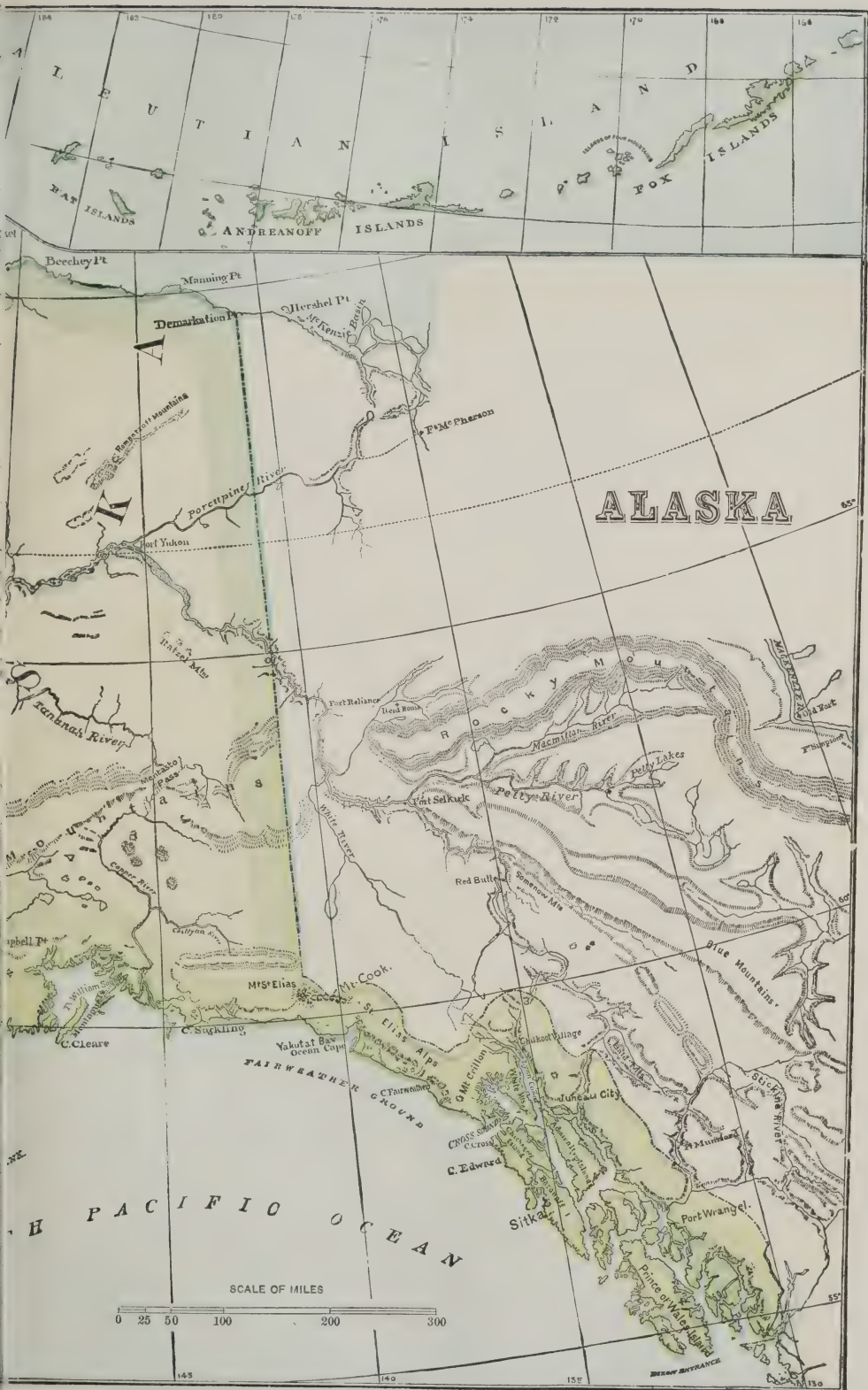
ALASKA, formerly Russian America, territory of the U. S., comprises the extreme n. western part of the North American continent, together with all the islands near its coast and the whole of the Aleutian archipelago, excepting Behring's and Copper Islands, lying off the coast of Kamtchatka. It is bounded on the n. by the Arctic ocean; on the e. by the Northwest territories of Canada and by British Columbia; on the s. and s.w. by the Pacific ocean; on the w. by Behring sea and the Arctic ocean. The greater part of the mainland lies between the 141st and 167th meridians of w. long., but the most westerly of the islands, Attu, lies in 173° east long. The mainland, on the n., extends to 71° 23' n. lat., and a narrow strip, about 30 m. wide, stretching down the s.e. coast, between the Pacific ocean and the dominion of Canada, touches 54° 40' n. lat. and the meridian of 130° w. long.; total length of mainland from n. to s., 1100 m.; greatest width, 800 m.; area, about 581,107 sq. m., or 871,908,480 acres, exceeding that of the original 13 states.

History.—In July, 1741, the Russian discoverer, Behring, sighted the American continent (possibly visited A.) and discovered a number of islands, among them that bearing his name. Russian explorers and traders gradually pushed further eastward, and in 1761 the coast of the Aliaska peninsula was visited by a merchant, Bechevin. As early as 1772 at least 25 trading companies were busy along the coast, and the explorations of Capt. Cook, the English navigator, in 1776, and his report of the existence of otters greatly stimulated Russian enterprise. In 1784 the first permanent settlement was made, on Kadiak island, and in 1790 Alexander Baranoff was made gov. of the vast region of A. In 1799 the Russian-American co. was chartered and was granted control of all Russian interests in North America for 20 years. Trading posts, including Sitka (1799), and missions of the Greek church were established at many new points, and Baranoff's successor (1819), Yanovsky, and others explored the n.w. coast and portions of the interior. The charter of the Russian American co. was renewed in 1820 and 1844. In 1864-67 parts of the country were explored by the Western union telegraph co. with the object of running a telegraph from America to Asia near Behring's strait, but the project was abandoned when the Atlantic cable was laid. In 1867, Mar. 30, the whole territory was ceded to the U. S. for \$7,200,000 in gold, and formal possession was given on Oct. 18 to a military force of the U. S. at Sitka. In 1868, July 27, the laws of the U. S. relating to customs, commerce, and navigation were extended over the mainland, islands, and waters. A military post was maintained at Sitka for 10 years, and other garrisons were established, but in 1877 all troops were withdrawn. In May, 1884, a territorial government was established, and the laws of Oregon adopted. In maintenance of its claim to joint possession with Russia of Behring sea (q. v.) as an inland water, the U. S. has several times seized British vessels engaged in taking fur seals. A treaty between the U. S. and Great Britain, signed Jan. 30, 1897, provided for the demarkation of the boundary between A. and the British North American possessions.

Topography.—The name A. (the Russian Aliaska) is said to be an English corruption

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of Al-ay-ek-sa, "the great land." A. is naturally divided into 3 regions, differing from each other in climate and agriculture: the Yukon district, comprising the country n. of the A. mts.; the Aleutian district, comprising the islands of that name and the peninsula; and the Sitka district, comprising the remainder of the territory. The northern ranges of the Rocky Mts. extend through the Sitka district, the Coast range having a width of from 50-75 m., and consisting of a succession of lofty mts., many of which exceed 12,000 ft. in height. Mt. St. Elias, one of the loftiest American peaks, is 19,500 ft.; Mt. Cook, 16,000 ft.; Mt. Crillon, 15,900. The Alaska Mts., one of these great Alpine ranges, turn to the s.w., extend along the southern side of the long peninsula of Aliaska, and are prolonged for 800 m. farther by the Aleutian islands. The Yukon Mts. farther n. have a nearly parallel direction. A large portion of the mainland, especially toward the n., is made up of dreary moors, marshes, and undulating plains. The principal river, the Yukon, one of the longest on the globe, and the largest American river emptying into the Pacific, rises in British Columbia, and after a course of about 2000 m., flows through a wide delta into Behring sea. It drains an area estimated at 200,000 sq.m., and is said to discharge every hour one third more water than the Mississippi. At a distance of 600 m. from the sea it is a m. wide, and it is navigable for steamers, in A., for 1206 m. Its chief tributaries are the Tananah and the Porcupine. The largest river flowing into the Arctic ocean is the Colville. The principal streams s. of the Yukon are the Kuskokwim and Copper. Owing to the peculiarities of its contour, the coast line is disproportionately long and measures 20,000 m., exceeding the entire coast line of the U. S. on the Atlantic ocean and gulf of Mexico. It is cleft by numerous bays and fiords, and by means of Kotzebue and Norton Sounds, Bristol Bay and Cook's Inlet, the mainland projects 4 great peninsulas into the sea. The most northerly part of the mainland is Point Barrow, on the Arctic coast, lat. $71^{\circ} 27' \text{ n.}$ The islands comprise about 31,200 sq.m. of the land area of A., and their principal groups are the Aleutian (q.v.), about 150 in number; the Pribyloff, or Prybilov (q.v.), the Kadiak or Kodiak, including Kadiak, 80 m. long, and the Alexander, 1100 in number, of which Sitka is the most important and Prince of Wales the largest. An idea of the extent of the coast line can be best conveyed by quoting the statement of Prof. Guyot: that the island of Attu is as far w. of San Francisco as the coast of Maine is e. of that city.

A. is noted for its glaciers, which abound in the valleys and along the coast, and include some of the largest on the globe. The Muir glacier, at Glacier Bay, fills a ravine or amphitheater, between the St. Elias Alps and the White mts., of about 1200 sq.m. in area, and discharges its surplus ice through an opening about 2 m. wide. Its depth, where it breaks off into the water, is estimated at nearly 1000 ft., and the amount of ice daily discharged during Aug., at 150,000,000 cubic ft. Another glacier, on the Stickine river, is 40 m. long and 4 or 5 m. wide. Extinct volcanoes are numerous, especially in the Aleutian islands, and there are others which are dormant, some of which have been active within recent years. Northern A. is famed for its auroral displays.

Geology and Mineralogy.—The upheaval of the Rocky Mts. took place, it is believed, during the jurassic period; that of the Coast Range at the end of the miocene. The extent and force of the volcanic disturbances in A. are proved by the great number of volcanic peaks, and the hot and boiling springs, some of which are of great extent. The glacial period, like the volcanic, still survives, some of the masses of ice that abound in mt. valleys and in ravines leading to the sea having a motion of many feet per day, that of the Muir glacier in the central part of its channel of exit being from 65-70 ft. Glacial debris and striae are found high up on the mt. sides, and the inlets of the western coast are doubtless the work of ancient glaciers. Beds of cretaceous and miocene lignites are found, also dikes of plutonic rock, and remains of the elephant and other mammals are abundant. Gold was discovered on the Kenai peninsula in 1848, but no attempts were made by the Russians to seek further for precious metals. In 1880 surface gold was found in s.e. A., and the search has since been diligently prosecuted. On Douglas, Admiralty, Prince of Wales, and other islands there are quartz-bearing ledges, and one mine on Douglas Island in 1886 turned out over \$100,000 in bullion monthly. Many claims lie close to the water's edge. The auriferous gravel beds of the Yukon and its tributaries are of great extent, and auriferous sands are worked at Yakutat Bay. A deposit of silver-bearing galena of great extent and purity exists at Golovin Bay, about 1000 m. n.w. of Sitka. Lignite coal of good quality is obtained at various points, native copper, cinnabar, graphite, mica, manganese (black oxide), and kaolin. There are large deposits of iron ore, and on Baránoff and Admiralty Islands, beds of fine white marble. Sulphur is abundant, petroleum is reported, also garnets and amber. Fossil ivory of some value is an article of commerce. Medicinal springs are a feature both of the islands and the mainland.

Zoology.—The principal fur-bearing animals are the black, white, blue, red, silver-gray, and cross foxes, marten, mink, otter, lynx, 3 species of bear, wolf, wolverine, and sable. The reindeer, moose, mountain sheep, mountain goat, beaver, ermine, muskrat, hare, squirrel, marmot, and porcupine are abundant, as are the walrus, sea otter, fur, hair and other species of seal. The islands of St. George and St. Paul, in the Pribyloff group, are the haunts of the fur-seal. (See *Industries*.) The waters afford over 60 species of food fishes. The cod is found along the whole s. shore, but the principal banks are off the Aleutian islands. Salmon are equally abundant, the king salmon of Bristol Bay

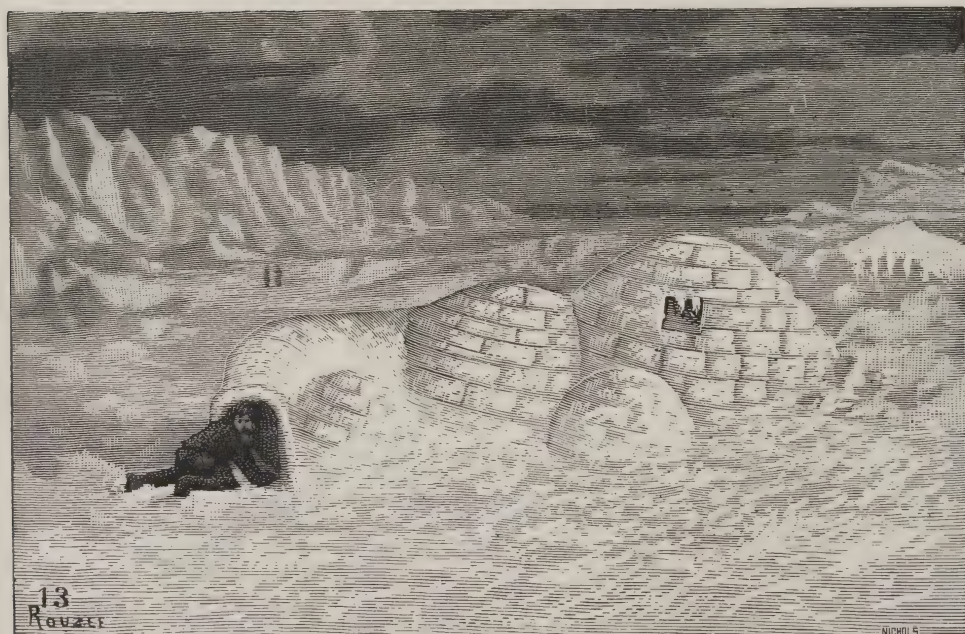
being noted for size and quality, also herring; and halibut, sea trout, Arctic trout, sea bass, mullet, ulicon, etc. The creeks and rivers swarm with salmon during the spawning season, and according to Dall, not less than 2,000,000 are caught and dried every summer by the natives at the mouth of the Yukon alone. Clams are plentiful along the eastern coast. The eagle, gull, puffin, ptarmigan, etc., are numerous.

Botany.—The interior of the country is well wooded. On the Pacific coast dense forests of spruce, yellow cedar, hemlock, and balsam fir clothe the mountain-sides, both on the islands and mainland. The spruce predominates and trees are found from 4-6 ft. in diameter at the base and growing to a height of from 30-40 ft. before branching. Its lumber resembles that of the southern or pitch pine. The yellow cedar is more limited in distribution, but is more valuable, yielding a hard and durable lumber invaluable for ships. The hemlock attains a large size, but is not plentiful. The white and the black birch are sparingly found. The poplar, willow, and alder are abundant. Many of the northern islands and parts of the coast are nearly if not quite destitute of trees. Red and black currants, gooseberries, cranberries, salmon berries, whortleberries, and strawberries and other fruits are indigenous.

Climate, Soil, and Agriculture.—The great gulf stream of the Pacific, known to geographers as the Japan current, strikes and divides on the western end of the Aleutian islands. A portion flows n. into Behring's sea, so that it is a remarkable fact that ice does not flow from the Arctic ocean southward through Behring's straits. The other portion sweeps southward and eastward, and makes the whole n.w. coast habitable, giving to southern A., on the coast and the adjacent islands, a winter climate milder than that of New York city. In the Yukon district the mean annual temperature is about 25° Fahr., and from 3-4 ft. below the surface there is a subsoil of frozen earth, from 6-8 ft. deep. This phenomenon is ascribed to the want of drainage, together with a covering of moss that shields the ground from the hot suns of the Arctic summer; yet, notwithstanding this ice subsoil, during the summer months there is a luxuriant growth of vegetation. The mean annual temperature of the Aleutian district is 36°-40° Fahr. During a period of 5 years the greatest cold was found to be zero and the highest temperature 77°. The Sitka district has a warmer and moister climate, the mean annual temperature being 44.7° and that in winter seldom reaching the freezing point. The average annual rainfall here is about 40 in. The rainfall on the upper Yukon is less than on the coast and the sunshine is more continuous. In the interior of A. the cold is extreme and there are regions covered with eternal ice and snow. Cyclones are unknown in A. The Aleutian islands and the mainland below the Coast range, extending n. and w. from Sitka to the peninsula, have a fertile soil, which is largely a vegetable soil with a clay subsoil, producing oats, barley, potatoes, and root crops. In favorable localities in s.e. A., cauliflower and cabbages are grown, and it is probable that in many parts all the cereals except corn can be raised. Blue, blue-joint, and wood-meadow grasses grow luxuriantly, and in s.e. A. pasturage is obtained during 8 months of the year. There are, however, few horses and cattle in the territory.

Industries.—These are principally the fur seal and salmon fisheries, and, since 1895, gold-mining. Over two-thirds of the annual catch of fur seals in the world is taken in Alaskan waters. The seal fishery is controlled by an American corporation, operating under stringent congressional regulations, and the government has received from the corporation for rent of the Pribyloff Islands (q. v.) much more than the amount paid for the purchase of Alaska. During the season of 1896 the lessees of the islands took 30,000 male seals, and 66 vessels engaged in pelagic sealing took 20,712. The males on the islands exceeded the needs of the herds there, but the number of seals frequenting the sea showed a steady decrease. The supply of salmon appeared to be inexhaustible. There were 29 canning establishments in operation, and 619,879 cases were packed in 1895, and a still larger number in 1896. The canneries employed 2,000 white men, 1,600 Indians, and 2,000 Chinese. Cod, halibut, and herring are caught in large quantities. Besides these and salmon, the waters of Alaska contain over 100 species of food fish. In 1896, congress provided for a regular inspection of all the fisheries. The development of gold mining has been extraordinary, following the reports of the first geological survey made by the government in 1895. The initial fields of operation were in the Sitka district, the Yukon river region, and along the coast in the vicinity of Cook's Inlet. During the year ending Oct. 1, 1896, the output of gold mines within Alaska was valued at \$2,300,000. Under the treaty of 1892, the United States and Great Britain appointed commissioners to survey the country through which the boundary runs. In 1895 some excitement was caused by a rumor that Great Britain claimed nearly 30,000 square miles of territory in Alaska, containing the best gold fields, but on Jan. 30, 1897, a treaty was signed providing for a commission to locate the boundary line, so far as it coincides with the 141st meridian.

Religion and Education.—The United States government maintains about 20 public schools in the mainland and islands. The Russian Greek Church has schools at Fort Kenai, Ninilchik, Tooyounok, and Alexandrofsk, and orphanages at Unalaska, Kodiak, and Sitka. Several schools and missions and an industrial training school at Sitka are supported by the Presbyterian Board of Home Missions. In 1895, the Rev. Peter T. Rowe, D.D., was consecrated the first Protestant Episcopal bishop of Alaska, the territory being raised from a missionary district, because of the large religious, educational and charitable interests that denomination had established there. The activities of the



ALASKA.—1, 2, 5, 6, Baskets; 3, Basket cover; 4, Carved horn ladle. 7. Stone axe and handle; snow-house, Alaska. 14.



9, Carved bone stakes for marten trap; 10, 11, 12, Carved horn spoons. 13. Eskimo trip by canoe.

various religious denominations comprise church, mission, day and boarding school, hospital, and training school buildings, and, at Auvik, a well-equipped saw mill for the industrial training of the natives. The congressional appropriation for educational work in Alaska for 1895-96 was \$30,000, an inadequate amount, because the closing of many contract schools threw an additional burden on the regular government schools. The strongest denominations are the Roman Catholic, Russian Greek, and Presbyterian.

Government, etc.—The capital and port of entry for the customs district of A. is Sitka, and here are situated the land office, court house, custom house, and penitentiary. The territorial officers are a gov. receiving \$3000 salary, a U. S. judge, a clerk and receiver of public moneys, a U. S. district attorney, a U. S. marshal and surveyor gen. All civil suits are tried by the U. S. commissioner. There are sub-ports of entry at Tongass, Wrangel, and Juneau in s.e. A., and on Kadiak and Oonalaska islands. There is a monthly mail service between Port Townsend and several ports in s.e. A.

The enforcement of law and order in all portions of A. is impossible, and except in the s. eastern part of the territory, civil government is merely nominal and, it is believed, must remain so until mail communication is established or those charged with the duty of administering it are furnished with some kind of safe and reliable transportation. In all the more remote sections of the territory the law prohibiting the importation and sale of intoxicating liquors and breech-loading fire-arms is openly violated; crimes, including murder, are committed with impunity, and there is no punishment for the offenders, for the simple reason that the officials are not provided with the means necessary to put the law in force. The indefiniteness of the boundary line between A. and the British possessions threatens, since the discovery of gold on the eastern tributaries of the Yukon, to become a cause of international disputes.

Native Races.—These are classed as Orarians and Indians; the Orarians being divided into Innuits or Eskimos and Creoles and Aleuts; the Indians into Tinneh, Thlinkets, and Hydahs—not to mention the many tribes, settlements, and families into which all these are sub-divided. The Orarians occupy almost all the coast and its outlying islands, and portions of the peninsula; the Indians possess the interior, the coast at Cook's inlet and Copper river, and the Alexandrian archipelago, southward from mt. St. Elias. The Innuits are described as tall, muscular, and good-natured, with coarse brown hair, yellow complexions, small eyes, and high cheek bones, and as having a common language split up into dialects. The Arctic division embraces about 30 small settlements (see illustration NORTH AND SOUTH AMERICA, figs. 9, 12, 20), but the majority are found on or near Norton's sound and the Yukon and Kuskokwim rivers. Although superior to the other Eskimos of the North American continent, the Innuits are savages, and those n. of the Aliaskan peninsula are nomadic in summer. The Aleuts or Unungum ("our people") occupy portions of the peninsula and the islands westward from the Shumagin group. They have an average height of 5 ft. 6 in., bear a strong resemblance to the Japanese, are civilized, Christianized, and more or less educated. The customs and modes of life of ancient times (see same illus., figs. 1, 17), have given place to those of the whites with whom they are associated. They are decidedly superior to both the Innuits and Indians, but under Russian rule, their condition was deplorable and their numbers were considerably lessened. The Tinneh ("people") are akin to the Indians of Oregon and California. They are tall, well formed, and brave; skilled hunters and fishers, but where uninfluenced by civilization are degraded in habits, believers in witchcraft, and live in abject fear of the Shaman or sorcerer. The Thlinkets resemble them. The Hydahs, on the southern end of Prince of Wales island are large, strong, light-colored, and noted for bravery and ferocity. They are skilled workers in wood and metal.

The Indians are sub-divided into various families, each of which has its badge or *totem*. Members of the same tribe may marry, but not members of the same badge. A wolf, for instance, is not permitted to ally himself with the wolf family, but may with that of the whale. The rank of a chief is indicated by the height of a pole erected in front of his house. In front of their leading houses and at their burial places are sometimes seen immense timbers covered with carvings which constitute the genealogical record of the family. Polygamy, with all its attendant evils, female infanticide and the slavery and degradation of women, are, or were, among the customs both of the Innuits, Tinneh, and Thlinkets. Among some of the Indians on the upper Yukon and around the shores of Behring's sea, the bodies of men are burned. Where wood is scarce, the bodies of women are not considered to be worth the wood that would be consumed in the burning. Among the Kariaks the old and feeble are sometimes put to death. In some localities cannibalism was practised in former times. In spite of the prevailing diseases—scrofula and consumption—and the devotion of certain tribes to intoxicating liquors, the natives are said to be increasing.

A. is celebrated for its canoes. Some of the largest of these canoes are from 60-75 ft. long, and 8-10 ft. wide, and will carry 100 people. The operation of making them is thus described: "Having selected a sound tree and cut it the desired length, the outside is first shaped, then the tree is hollowed out till the shell is of proper thickness; this is done with a tool resembling a grubbing-hoe, or narrow adze with a short handle. It is then filled with water, which is heated by throwing in hot stones. The canoe is then covered with a canvas to keep the steam in. This softens the timber, and the sides are distended by cross-sticks to the desired breadth at the center, and tapering toward the

ends in lines of beautiful symmetry. It is finished off with a highly ornamental figure-head, and the bulwarks strengthened by a fancy covering board." The Aleuts use canoes made of the skin of the hair seal or sea lion.

A fishing scene on the Naass river, witnessed by a missionary, is one of many graphic descriptions in Jackson's work on A. : "It was what the Indians call their 'small fishing.' The salmon catch is at another time. These small fish are valuable for food and also for oil. They come up for six weeks only, and with great regularity. The Naass, where I visited it, was about a mile and a half wide, and the fish had come up in great quantities, so great that, with three nails upon a stick, an Indian would rake in a canoeful in a short time. Five thousand Indians were gathered together from British Columbia and Alaska, decked out in their strange fantastic costumes, faces painted red and black, and they had feathers on their heads and imitations of wild beasts on their dresses. Over the fish was an immense cloud of sea-gulls, so many and so thick, as they hovered about looking for fish, the sight resembled a heavy fall of snow. Over the gulls were eagles soaring about and watching their chance. After the small fish had come up larger fish from the ocean. There was the halibut, the cod, the porpoise, and the fin-back whale; man life, fish life, and bird life—all under intense excitement."

Population, etc.—In 1880 this was estimated at 33,426—17,617 Eskimos, 1756 Creoles, and 430 whites. In 1887 it was estimated at 39,000—5000 whites, 1800 Creoles, who are practically white, and 3000 Aleuts. The census for 1890 gives a total population of 30,329.

Of this population about 25,000 are found in that section of the territory westward from Kadiak, including the villages along the coast and islands, to the end of the Aleutian peninsula. These contain about 4800 Creoles and Aleuts, who are civilized, and, to a large extent, educated. They reside mainly on the islands and are generally members of the Greek church. In the s. eastern section of the territory the white population is estimated at 2000, residing principally at Sitka, Juneau, Douglas Island, Wrangel, Killisnoo, and some smaller points, while the natives number 7000 or 8000.

St. Michael's or Michaelofsky is the principal seat of the Yukon river trade, and Fort Wrangel or Wrangell, on the n. western coast of Wrangel Island, at the mouth of the Stickine river is a business center for s. eastern A. Belkofsky, near the southern extremity of the peninsula, is the principal depot for the trade in sea otter furs. See Bancroft's *History of Alaska, 1730-1885* (San Francisco, 1886); Ray's *Report of the International Polar Expedition to Point Barrow, 1881-83* (Washington, 1885); Seton Karr's *The Shores and Alps of Alaska* (1887); Elliott's *Our Arctic Province and Alaska and the Seal Islands* (1886); Schwatka's *Along Alaska's Great River* (New York, 1885); Wright's *The Ice Age in North America* (New York, 1889); Jackson's *Alaska and the Missions of the North Pacific Coast*; Mrs. E. S. Willard's *Life in Alaska* (1884); Ballou's *The New Eldorado* (Boston, 1889); *The Alaska Coast Pilot*, a government publication; *Report of the Governor of Alaska to the Secretary of the Interior* (1896).

ALASKA SABLE. A euphemistic name given by dealers in fur and also by their customers to the fur of the skunk (q. v.).

ALATAU ("mottled"), a name given to a range of lofty mts. forming the boundary between Turkestan and Mongolia, and the northern limit of the great table-land of central Asia. It is made up of five sierra-like sub-ranges, the Zungarian, the Trans-Ili, the Kungei, and the Terskei A., the fifth, running west, having been renamed by the Russians the Alexander range. These are all grouped round lake Issik-Kul (elevation, 5300 ft.) as a central point. The mts., which are principally of granite formation, range generally in elevation from 10,000 to 15,000 ft., and the loftiest peak, Khan Tengri, is 24,000 ft. above the sea.

ALATER NUS, according to some, a genus of plants of the natural order *rhamnaceæ* (q. v.), akin to *rhamnus* (see BUCKTHORN) but more generally regarded as a sub-genus of *rhamnus*, consisting of evergreen shrubs, of which the best known is *rhamnus A.*, or *A. phillyrea*, a large shrub, densely branched, with shining alternate leaves, which are more or less ovate. The flowers are dioecious, racemed, numerous, and small, much sought after by bees. This shrub is abundant in Europe.

ALATRI, a t. in Italy, 6 m. n. of Frosinone. It is the see of a bishop, and shows considerable remains of Pelasgian antiquity. Population about 14,000. The ancient name was Alatrium.

ALAU'DA, genus of birds, including larks, chiefly noted as song birds. They are found in all countries, but abound especially in Europe. They are birds of passage, and some of the genus are esteemed for the table.

ALAU'SI, a t. of the republic of Ecuador, South America, in the province of Chimborazo, 65 m. e. from Guayaquil, at an elevation of 7980 ft. above the sea, in a valley of the Andes, on the river Alausi, which flows into the gulf of Guayaquil. The valley of the Alausi is extremely fertile, producing sugar, grain, and fruits. There are hot springs in the town. Pop. estimated at 4000 to 6000.

A'LAVA, one of the provinces of Spain, 1200 sq. m. Its surface is mountainous, especially in the n., where the Pyrenees form the natural boundary. It is separated from Logrino by the Ebro; the Zadowa and the Ayadak are the other rivers. The soil is fertile, producing wheat, barley, maize, flax, hemp, and fruit. The mountains are covered

with forests of oak, beech, chestnut, etc., and contain iron, copper, lead, and marble. Pop. '87, 92,893. Capital, Vittoria.

ALAVA, DON MIGUEL RICARDO D', a Spanish general, b. at Vittoria, in 1771, of a noble family, in the province of Alava. He entered the navy in early life; but afterwards changed to the land-service. After the abdication of Ferdinand VII., he was for a time a zealous partisan of France; however, in 1811, when he saw the fortunes of Joseph beginning to wane, he abandoned the cause of this prince, to embrace that of the national party, and accepted the office of Spanish commissary on the staff of Wellington. He gained the confidence of this general, and from this time manifested the strongest predilection for England and English institutions. The war of independence furnished him with numerous occasions of distinguishing himself. After the restoration of the king, however, he was arrested, on the suspicion of entertaining liberal opinions; but on the application of his uncle, Ethenard, the inquisitor, seconded by the influence of Wellington, he was not only liberated, but appointed ambassador to the Hague. He returned to Spain in 1820, after the revolution; became captain-general of Aragon, made himself conspicuous among the Exaltados, and figured in the ranks of the militia on occasion of the revolt of the royal guard at Madrid, July 7, 1822. In the cortes assembled at Seville in 1823, he voted for the suspension of the royal authority, and took part in the negotiations carried on with the duke of Angoulême, at Cadiz. The re-establishment of absolute monarchy in the peninsula drove him, as a political refugee, to Brussels and England, till, at the death of Ferdinand, he was recalled by the regent, Maria Christina. In 1834, he was appointed Spanish ambassador to London; and towards the end of 1835, he undertook a mission to Paris. Under the administration of Isturiz, A. showed himself as zealous for the moderate system as he had been for the preceding one, and advocated the French intervention, which he had opposed during his embassy to London. After the insurrection of La Granja, he refused to swear to the constitution of 1812, declaring that he was tired of constantly taking new oaths; he gave in his resignation accordingly, and retired to France, where he died in 1843.

ALAY, a Turkish ceremony on the assembling of the forces at the breaking out of a war; essentially a public display of the sacred standard of Mohammed, which may be looked upon only by Moslems and touched only by emirs. Once when the standard had been shown, the rule was forgotten, but when remembered all the Christians who had innocently looked at the banner were slaughtered.

ALBA (ancient *Alba Pompeia*), a very ancient city of north Italy, in the province of Cuneo, on the right bank of the Tanaro, 31 m. s.e. from Turin. It is situated in a plain surrounded by hills. The neighborhood produces much wine and silk, besides corn, oil, and fruits. The town has an extensive trade in cattle. It is an episcopal seat; the cathedral was founded in 1486. Pop. 6000.

ALBA, or **ALVA**, FERDINAND ALVAREZ DE TOLEDO, Duke of, prime minister, and gen. of the Spanish armies under Charles V. and Philip II., was b., in 1508, of one of the most illustrious families of Spain. He was educated under the eye of his grandfather, who instructed him in the arts of war and of government. He fought, while yet a youth, at the battle of Pavia, and had the custody of Francis I. while a prisoner. He commanded under the emperor Charles V., was present at the siege of Tunis, and accompanied the expedition against Algiers. He defended Perpignan against the dauphin, distinguished himself in Navarre and Catalonia, and was in consequence created duke of A. His cautiousness and his taste for political intrigue afforded as yet no very high evidence of his military talents; and even Charles V., whom he counseled, when in Hungary, to build a bridge of gold for the Turks, rather than hazard a decisive battle, seems to have intrusted him with the command rather as matter of personal favor than recognition of his abilities. His pride was hurt at the low estimation in which he was held; and his real genius began to show itself. The victory which Charles V. gained at Mühlberg over John Frederic, elector of Saxony, in 1547, was due to the able generalship of the duke of A. Under his influence, as president of the council of war, the captive elector was condemned to death; and it was entirely against his wish that the emperor commuted the sentence. He took part under the emperor in the expedition against Henry II., king of France, who had taken possession of Metz; but here his exertions, as well as those of the emperor, proved unavailing. He was more fortunate in Italy against the combined armies of the pope and the French king, which he repeatedly defeated during the campaign of 1555. After the abdication of the emperor Charles V. in 1556, he continued to hold the command of the army, and overran the states of the church, which, after the retreat of the French army in 1557, lay entirely at his mercy. He was obliged, however, by the command of Philip II., to conclude a peace with pope Paul IV., and restore all his conquests. Being recalled from Italy, he appeared in 1559 at the court of France, with which Spain had become reconciled by the peace of Château-Cambresis, April 3, 1559; and as proxy for his sovereign, espoused Elizabeth, Henry II.'s daughter.

When the inhabitants of the Netherlands, who had been accustomed to freedom, revolted against the tyranny of Spain, and especially against the hated inquisition, the duke of A.'s counsel was to suppress the insurrection forcibly and with rigor. The king accordingly committed the matter to his hands, and sent him to the Netherlands, 1567, with unlimited power and a large military force. His first step on arriving was to estab-

lish what was called the "bloody council," in which he himself at first presided, and over which he afterwards appointed the sanguinary don Juan de Vargas. This tribunal condemned all without distinction whose opinions appeared dubious, or whose wealth excited jealousy. The present and the absent, the living and the dead, were subjected alike to trial, and their property confiscated by the council. A number of the merchants and mechanics emigrated to England; above 100,000 abandoned their native country, and many others enlisted under the banners of the proscribed princes, Louis and William of Orange. A., rendered still more savage by a defeat which befell his lieutenant, the duke of Aremberg, put to death the counts Egmont and Horn on the scaffold. He afterwards defeated Prince Louis, and compelled William of Orange to retire to Germany; upon which he entered Brussels in the greatest triumph on the 22d Dec., 1568. The pope presented him with a consecrated hat and sword, as defender of the Catholic faith; an honor which, having been hitherto conferred only on crowned heads, increased his insolence to the highest degree. He caused a statue to be cast, in which he was represented as trampling under foot two human figures, representing the nobles and people of the Netherlands; and this he set up in Antwerp. His executioners shed more blood than his soldiers; and none now withstood his arms except Holland and Zealand. But these provinces continually renewed their efforts against him, and succeeded in destroying the fleet which had been equipped by his orders. This disaster, and perhaps still more the apprehension that he might lose the king's favor, induced him to request that he might be recalled. Philip gladly acceded, as he perceived that the obstinacy of the rebels was only increased by these cruelties, and he was desirous of trying the effect of milder measures. A. accordingly resigned the command of the troops to Don Louis de Requesens, and, Dec. 18, 1573, left the country, in which, as he himself boasted, he had executed 18,000 men. The war which he had kindled burned for 68 years, and cost Spain \$800,000,000, her finest troops, and the loss of seven of the richest provinces of the Netherlands.

A. was received at Madrid with the highest distinction, but did not long enjoy his former consideration. Don Frederic, one of his sons, having seduced one of the queen's ladies of honor under promise of marriage, and being arrested on this account, the father assisted him to escape, and, in opposition to the desire of the king, united him in marriage to one of his relatives. He was in consequence banished from the court to his castle of Uzeda, where he lived two years. But now the troubles in Portugal, the crown of which Philip claimed as his hereditary right, induced the king to draw A. anew from his retreat. The duke accordingly led an army into Portugal, and drove out don Antonio, who, as grandson of John III., had taken possession of the throne. The whole country was speedily conquered (1581); and A., with his accustomed cruelty and rapacity, seized the treasures of the capital himself, while he allowed the soldiers to plunder without mercy the suburbs and the surrounding country. Philip, dissatisfied with these proceedings, desired to have an investigation of the conduct of the duke; but the haughty bearing of the latter, and the fear of a revolt, induced him to abandon it. A. d. at Lisbon, Dec. 11, 1582, at the age of 74. He had a fine countenance, with a haughty air and a robust frame; he slept little, while he both labored and wrote much. It has been said of him, that during 60 years of military service he never lost a battle, and never allowed himself to be surprised.

ALBACE/TÉ, a t. of Spain, capital of the province of the same name, in Murcia, 138 m. s.e. from Madrid, and a station on the railway from Madrid to Alicante. It stands in a fertile but treeless plain, is built with some degree of regularity, and contains a number of squares and many good houses. It is a place of considerable trade, and has great cattle-fairs in Sept. It was formerly noted in Spain for the manufacture of knives and other steel goods, which, however, were very inferior to those of Sheffield. Annual cattle fairs are held here. Pop. 20,700. — The province of Albacete is partly formed from the former kingdom of Murcia, and partly from New Castile. The river Segura drains the province. It is generally hilly, and in some parts mountainous, some of its mountains attaining an altitude of 5000 feet; but it contains also rich plains and fertile valleys. Agriculture is in a more advanced state than in most parts of Spain, and the mineral wealth of the province is said to be considerable. It produces grain, oil, wine, tobacco, fruits of various kinds. Large numbers of cattle, horses, sheep, and goats are reared. The area of the province is 5972 sq. m.; pop. '87, 229,492.

ALBA LONGA, one of the most ancient cities of Italy, situated on the rocky ridge that runs along the eastern shore of the Alban lake, between the lake and the Alban mount. See **ALBANO**. According to legendary history, it was built by Ascanius, the son of Æneas, about 300 years before the foundation of Rome, which is represented as a colony of A. Notwithstanding this, the Romans, under Tullus Hostilius, destroyed the city, and removed the inhabitants to Rome. It seems certain that A. was an important city long before the existence of Rome, and the head of a confederation of Latin towns, and that when it was destroyed, many of its inhabitants settled at Rome. Some traces of its walls are yet to be seen.

ALBAN, SAINT, the first martyr of Britain, was b. at Verulam, in the 3d c., and after having long lived as a heathen, was converted to Christianity, but put to death at the commencement of Diocletian's persecution of the Christians. His anniversary is

celebrated on the 22d June. The t. of St. Albans, which bears his name, is believed to stand on the site of his birthplace, or the scene of his martyrdom. See ALBANS, ST.

ALBANEN'SES, a division of the sect of Catharists in the 11th c., holding the Gnostic doctrine of two principles, good and evil. They denied the divinity of Christ, and rejected the story of his death, resurrection, and ascension; they denied the resurrection of the dead; and believed the judgment day was passed, and hell's torments are suffered in this life; they also denied free will and original sin, and held that man can impart the Holy Spirit to himself.

ALBANI is the name of a rich and celebrated family of Rome, who came originally from Albania in the 16th c., and settled first at Urbino. The great influence of the family dates from the accession (1700) of Giovanni Francesco A. to the papal throne as Clemens XI. It has since furnished a succession of cardinals.

ALBANI, EMMA (stage name of Emma La Jeunesse), b. Canada, 1851; opera singer, whose first public appearance was at Albany, N. Y., when but 12 years old. She studied under Duprez, of Paris, and Lamperti, of Milan, making her début at Milan, 1870. She m. 1878, Mr. Ernest Gye, of London. Among her impersonations are *Elsa* in "Lohengrin," *Elizabeth* in "Tannhäuser," and in 1896 she appeared in "Tristan und Isolde."

ALBANI, FRANCESCO, a painter of the Bolognese school of the time of the Caracci; b. at Bologna 1578, and d. there in 1660. He studied, along with Guido Reni, first under Calvert, and afterwards under the Caracci. He has painted above fifty altarpieces, worthy of the Caracci school; but his inclination lay more to the representation of scenes of a playful and pastoral or of a mythical kind, and of this nature are the greater part of his pieces. He had by his second wife a family of twelve children of extraordinary beauty, in whom he found exquisite models for his Venuses, Galateas, and angels' heads with the disadvantage, however, of imparting a certain uniformity to the countenances of his figures. His representation of the four seasons, so often imitated, gained him great renown. A.'s chief defect lies in the expression of life and feeling.

ALBANIA forms the s.w. district of European Turkey, and occupies the w. of the Balkan peninsula, from Bosnia and Montenegro to the Greek frontiers, which the Berlin congress of 1878 recommended should be advanced to the Kalamas river. Upper or northern Albania corresponds to the Illyria of the Romans, and lower or southern Albania corresponds to the ancient Epirus. On the east boundary, forming the watershed of the peninsula, rises the range of the Bora-dagh and the Pindus. The first detaches itself from the wild masses of the Tshar-dagh (dagh in Turkish means *mountain*) and Argentaro mountains; and west of it lie parallel chains, inclosing on the one side long elevated valleys, and sinking on the other in terraces down to level strips along the coast, consisting mostly of unhealthy swamps and lagoons. Pindus, to the s., is also flanked by isolated basins or hollows, whose western edges pass into the jagged and thick-wooded Ebirotic highlands. These highlands advance to the sea, forming steep rocky coasts; one promontory, the Acroceranunian, projecting in cape Linguetta far into the sea, reaches a height of 4000 to 5000 ft.

The chief rivers are the Bojana, the Drin, the Skombi, Ergent, Vojussa, Glykys or Acheron (which follows for some distance a subterranean channel, and on reappearing is called Mauropotamos), the Arta, and the upper course of the Aspropotamos. Among the lakes, those of Bojana, Ochri, and Janina are the most important.

A fine climate, the heat of which is tempered by high mountains and the proximity of the sea, and a favorable soil, would seem to invite the inhabitants to agriculture; but for the most part in vain. In the north little or nothing is cultivated but maize; in the moist valleys, a little rice and barley are produced; but the mountain-terraces are used as pastures for numerous herds of cattle and sheep. In Epirus there is more variety. Here the slopes of the lower valleys are covered with olives, fruit and mulberry trees, intermixed with patches of vines and maize, while the densely wooded mountain-ridges furnish valuable supplies of timber. The plateau of Janina yields abundance of grain; and in the valleys opening to the s. the finer fruits are produced, along with maize, rice, and wheat. Even cotton and indigo might be profitably cultivated in the moist valleys; but in its present wretched condition the country can barely support its scanty population.

The inhabitants, estimated at about 1,400,000, form a peculiar people, the Albanians or Arnauts; they call themselves Skypetars. They are descendants of the ancient Illyrians, mixed with Greeks and Slaves, and not to be confounded with the Albani that live on the Caspian sea. The Albanians are half-civilized mountaineers, frank to a friend, vindictive to an enemy. They are constantly under arms, and are more devoted to robbery and piracy than to cattle-feeding and agriculture. They live in perpetual anarchy, every village being at war with its neighbor, and even the several quarters of the same town carrying on mutual hostilities. Many of them serve as mercenaries in other countries, and they form the best soldiers of the Turkish army. At one time the Albanians were all Christians; after the death of their last chief, the hero Scanderbeg, and their subjugation by the Turks, a large part became Mohammedans, who distinguished themselves by cruelty and treachery towards the tribes that remained true to their old faith. The steep valleys of the Acheron in the s., forming the district of

Suli, are inhabited by a powerful tribe, the Suliotes, who till their fields sword in hand, and conceal their harvests in the earth. They made themselves famous by their long resistance to Ali Pasha. In the n., between the Black Drin and the sea, is the country or circle of the Mirdites, i.e., the brave, who are always ready with weapons in their hands to defend their freedom and their religion—the Roman Catholic. A. is officially divided between the vilayets of Scutari and Janina. The divisions chiefly recognized by the Albanians themselves are the varieties of the native tribes, which col. Leake divides into the Ghegides, whose chief towns are Dulcigno, Scutari, and Durazzo; the Toskides, in Berat and Elbasan; the Liape, in the mountains between the Toske and Delvino; and the Tsami, in the s. Albanians form an element in the population of Greece, Italy, Sicily, Montenegro, Bulgaria, Dalmatia and Slavonia.

ALBANIA, in ancient geography, a country in Asia on the w. side of the Caspian sea and n. of Armenia, corresponding with the modern Daghestan, Schirvan, and Laghistan. It is mostly alluvial, made by the river Cyrus, and is very fertile. The ancient Albanians were described as tall, very strong, and of graceful appearance. They were nomads, and never went into agriculture or trade. The Romans under Pompey first encountered them (65 B. C.) and found a force of 60,000 infantry and 22,000 cavalry contesting the road. Pompey secured a nominal submission, but they continued practically independent.

ALBANO, a t. of Italy, about 18 m. from Rome, on the declivity of the lava-walls which encompass the lake Albano. It is the seat of a bishop, has about 7000 inhabitants, and is surrounded with handsome mansions of the wealthier Romans. It is on the opposite side of the lake from where Alba Longa stood, and owed its origin to the villas of ancient Roman magnates, such as Pompeius, Domitian, and Clodius. A valuable wine is produced in the environs. Near the town, on the old Appian way, are found the remains of an amphitheatre, and a sepulchre of Etruscan architecture.

THE ALBAN LAKE, or lago di Castello, is formed in the basin of an extinct volcano, and has a circumference of 6 m., with the enormous depth of more than 1000 ft. Its elevation is nearly 1000 ft. above the sea-level. While the Romans were at war with the Veientes (390 B. C.), this lake rose to an extraordinary height in the heat of summer, and without any apparent cause. Etruscan diviners declared that the conquest of Veii depended upon letting off the waters of the lake. Stimulated by this, the Romans, under the direction of the Etruscans, opened an emissary or tunnel through the lava-wall which bounds it. In the execution of this work they acquired the art of mining, which they now applied to undermine the walls of Veii. The tunnel, which still remains, and still fulfills its ancient office, is $1\frac{1}{2}$ m. in length, with a height of 7 ft. and a width of 4 ft. On the eastern bank of the lake, rises monte Cavo, the ancient Mt. Albanus, 3000 ft. high, affording an extensive and magnificent view from its summit. Upon it once stood the magnificent temple of Jupiter Latialis, which was approached by a paved way, for the ascent of the solemn processions of the Latin confederation (*Feria Latina*), and for the ovations of Roman generals. The road remains, in great part, perfect to this day.

The Albano stone, called Peperino, was much used in Roman buildings. It is a kind of volcanic tufa, of an ash-color, and is still quarried extensively at A.

ALBANS, Sr., an ancient borough in Hertfordshire, situated on the top and northern side of a picturesque hill, 21 m. n.w. from London. The Ver, a small tributary of the Colne, separates it from the site of the ancient Verulamium (Verulam), an important station in the time of the Romans, and the scene of a terrible slaughter in the insurrection under Boadicea. In honor of St. Alban, said to have suffered martyrdom here in 297, a Benedictine monastery was founded by Offa, king of Mercia, in 796. The foundation of the t. is supposed to be due to Ulsig (or Ulsin), who was abbot about 150 years later. Two battles were fought near St. A. during the wars of the roses, in 1455 and 1461. In the first Henry VI. became a captive; in the other, he was set at liberty by his brave queen, Margaret of Anjou. The old abbey-church, restored in 1875 by Sir Gilbert Scott, is a cruciform building of irregular architecture, 547 ft. in length by 206 in breadth, with an embattled tower 146 ft. high. The abbot of St. A. had a seat in the house of peers, and had precedence of all other English abbots. In St. Michael's church is to be seen a monument to the memory of the great Bacon, who bore the titles of baron Verulam and viscount St. A. More recently, the Beaclerk family have taken from this place the title of duke, and the Grimston family that of earl. The borough was disfranchised in 1852 for bribery. Pop. '91, 12,895, many of whom are employed in straw-plaiting. St. A. has recently been made the centre of a new diocese of the church of England, its first bishop having been enthroned in June, 1877.

ALBANS, St., in Vermont. See **ST. ALBANS**.

ALBANY, or **ALBAINN**, an ancient name for the highlands of Scotland, and retained in some degree of use down to our own day. Connected with it is the term *Albiones*, applied to the inhabitants of the entire British island in Festus Avienus's account of the voyage of Hamilcar, the Carthaginian, in the 5th c. B. C.; also the term *Albion*, which appears as the name of the island in Aristotle's *Treatise of the World*. It may, indeed, be pretty safely assumed that Albion or Albany was the original name of Britain among its Celtic population; and that it only became restricted to the n.w. provinces of Scotland

when the Celts had for the most part become confined to the same region. Albainn means a country of heights (the root being *alb*, or *alp*, a height) ; and it is remarkable to find Albania also a mountainous country. The modern use of the name A. may be said to have taken its rise in an act of a Scottish council held at Scone in June, 1398, when the title of duke of A. was conferred on the brother of king Robert III., then acting as regent of the kingdom. The title, being forfeited in the son of the first holder, was afterwards conferred on Alexander, second son of king James II., in the person of whose son, John, it became extinct in 1536. Subsequently it was conferred in succession on Henry lord Darnley, on Charles I. in infancy, on James II. in infancy, and (as a British title) on Frederick, second son of George III. Prince Charles Stuart assumed the appellation of Count of A. as an incognito title, and gave the title of duchess of A. to his legitimated daughter. The title was restored in 1881 and conferred upon prince Leopold.

ALBANY, a co. in e. N. Y., on the w. side of the Hudson river, 499 sq.m. ; pop. '90, 164,555. The surface is hilly and mountainous in the s. : soil good in the valleys, but on high ground sandy and poor. Marl, gypsum, magnesian limestone, and iron are found. Several railroads intersect it, including the great New York Central and Hudson River, the first section of which, from A. to Schenectady, was the earliest railroad in the state. The staple products are wool, grain, hay, milk, etc. Co. seat, Albany.

ALBANY, a co. in the s.e. part of Wyoming ; 4500 sq.m. : drained by the n. fork of the Platte and the Laramie r. It is mountainous, Laramie peak being 10,000 ft. above sea-level. The Union Pacific railroad runs through the co. Cattle and wool are the staples. Co. seat, Laramie. Pop. of co., 1890, 8865.

ALBANY, capital of New York state and of Albany county, is on the west bank of the Hudson River, nearly six miles below the head of navigation ; in latitude 42° 39' 49" north, and longitude 73° 44' 33" west ; 145 miles north of New York and 200 miles west of Boston.

The first settlement in Albany was made as early as 1540 by some Frenchmen, who commenced erecting a castle near the site, and the place was called Castle until the Dutch took possession of it in 1617 ; they had built a stockade called Fort Nassau, on an island below the present location, in 1614, but removed to the mainland and called their settlement Beverwyck. In 1624 Fort Orange was erected in what is now the heart of the city. In 1626 the Indians destroyed the place, and the inhabitants were sent down the river to New Amsterdam for safety. In 1629 originated the "patroon" system, by which the settlers rented their lands from the patroon or lord of the manor, who had absolute title to the soil, his tenants being little more than serfs. Killien Van Rensselaer and others received a grant of land extending along the Hudson twenty-four miles square, including Fort Orange and Beverwyck, and Van Rensselaer became the first patroon. He erected a large mansion, with extensive grounds, which remained standing until 1894, when it was removed to Williamstown, Mass., to be used as a chapter house for the Sigma Phi Society. The property descended through five generations, but the patroonship became obsolete after the Declaration of Independence. What is known as the "Anti-Rent War" was the result of an attempt to collect these rents for years after the Revolution, and caused the troops to be called out many times. It was finally arranged in 1853, and most of the tenants received a fee simple of their lands. In 1664 Beverwyck, Fort Orange, and Willemstadt became English possessions, and were called Albany. In 1686 Albany was the first city in the thirteen colonies to be incorporated. In June, 1764, the first general Congress of the Colonies met there, and in 1797 it was made the permanent capital of the state. In that year and in 1848 it suffered severely from fires. In 1886, July 18th to 22d, the bi-centennial of its incorporation was celebrated with elaborate ceremonies, and on Jan. 6, 1897, the centennial of the selection of the city as the state capital.

Albany has a river frontage of four miles, and for about 300 feet back the ground is comparatively level and is subject to overflow. From that point four hills, separated by ravines, rise westward to a plateau elevated about 200 feet, Prospect Hill reaching an altitude of 301 feet. Upon these hills are the Capitol and many elegant residences, stretching away in the distance, giving a very picturesque effect to the city, when viewed from the river or the opposite shore. There are numerous parks, large and small, of which the most extensive and picturesque is Washington Park, containing eighty-one acres, a lake 1700 feet long, and a fountain which is a work of art. This was the gift of Col. Henry L. King, in memory of his father, Rufus H. King, and was designed by J. Massey Rhind. The subject is Moses smiting the Rock, and besides the central figure, twenty-nine feet above the basin, there are grouped about upon the rocks a woman with two children, a maiden, a soldier, and an old man. Of the many cemeteries, Rural, four miles above the city, and shared by Troy, is one of the finest in the country. Here is the tomb of President Arthur, with a magnificent mausoleum, designed by Ephraim Keyser, representing a life-sized angel placing a palm upon the bier. The streets are many of them narrow and steep ; some still retain the old cobble-stone pavement, although on others many miles of asphalt and granite have been laid. State street, leading to the Capitol, is broad, but steep, and was formerly the general market-place. Electric roads furnish transportation to all parts of the city and suburbs. Water is supplied from an artificial lake five miles distant, and also from the Hudson ; it is pumped into reservoirs on Prospect and Bleecker Hills. The fire and police departments are well equipped and efficient.

The Capitol is built of Maine granite, in the Renaissance style, with dome-capped tower, and cost more than \$18,000,000. It contains an assembly room, senate, court of appeals, state library of over 122,000 volumes, and rooms for state officers. Many relics of the Revolution and Civil War find place in its spacious corridors. The City Hall, erected in 1882, Custom-House, Post-Office, State Agricultural Museum, Geological Hall, Merchants' Exchange, Hermann's Bleecker Hall, State Penitentiary, many elegant churches and two cathedrals are among the public buildings. The Delevan House, for fifty years known as the resort of politicians and eminent men, was burned on the night of the 31st of December, 1894.

Excellent public schools, academies, a high school, normal college and St. Agnes' school for young ladies furnish educational facilities. Connected with Union University at Schenectady are Dudley Observatory, a law school and medical college. There are four fine libraries, and many newspapers, daily and weekly. There are immense blast-furnaces, foundries, breweries, shoe factories, etc. Assessed valuations (1895) real estate, \$58,549,720, personal, \$6,426,995; total, \$64,976,715; tax rate \$20 per \$1000; net debt (1896) \$3,042,327. In 1896 the combined capital of national banks was \$1,550,000; deposits, \$6,386,190; resources, \$13,158,686. Albany has long taken a high rank in the lumber trade, its products amounting annually to several millions. It is also a large barley market. Population, 1820, 12,630; 1880, 90,758; 1890, 94,923.

ALBANY, capital of Linn county, Oregon, is on the Willamette river, twenty-eight miles south of Salem and eighty-one south by west from Portland. It is located in an extensive valley noted for its beauty and fertility. It has good school buildings, Albany college, banking facilities, newspapers, churches, and good water supply. There are wagon, match, and furniture factories, saw and planing mills, foundries and machine-shops, a wire-cloth factory and woolen and flouring mills. Flour, grain and fruit are exported. Population, 1890, 3079.

ALBANY, a maritime division of Cape Colony, Africa, about 450 m. e. of Cape Town; 65 m. long by 30 or 40 wide; traversed by Great Fish River. It produces maize, barley, and cotton. Capital, Grahamstown, pop. '91, 10,498.

ALBANY, LOUISA-MARIA-CAROLINE, also ALOYSIA, Countess of, wife of the unfortunate Charles Edward Stuart (q. v.), grandson of James II. of England. She was the daughter of prince Gustavus-Adolphus of Stolberg-Gedern, who fell in the battle of Leuthen in 1757. This lady was b. in 1753, and, during her married life, bore the name of the countess of A. She had no children; her marriage proved an unhappy one, and in order to escape from the ill-usage of her husband, who lived in a state of continual drunkenness, she sought refuge in a nunnery, 1780. At the death of the prince in 1788, the court of France allowed her an annual pension of 60,000 livres. She outlived the house of the Stuarts, which became extinct at the death of her brother-in-law, the cardinal of York, in 1807. She died at Florence, which was her usual place of residence, on the 29th of Jan. 1824. Her name and her misfortunes have been transmitted to posterity through the works and autobiography of Alfieri (q. v.), with whom she lived after the death of the prince. Their remains repose in the same tomb in the church of Santa Croce at Florence, between the tombs of Macchiavelli and Michael Angelo.

ALBATEG'NI I., d. 929; an Arabian astronomer, whose proper name was MOHAMMED IBN JABIR IBN SENAN ABU ABDILLAH, named from Batan in Mesopotamia, of which t. he is said to have been chief. His astronomical observations extended over more than 60 years, and were conducted on the Euphrates and at Antioch in Syria. His chief work, *The Science of the Stars*, was published in 1537 from the original manuscript in the Vatican library. He recast and improved Ptolemy's tables, and came as near to the obliquity of the ecliptic as 23° 35'. His tropical year was nearer than Ptolemy's, being only 2 m. 26 s. short. The Alphonsine tables of the moon's motion were founded upon his observation, and he first substituted sines for chords, and also introduced into trigonometry the use of tangents and versed sines. He was called "The Arabian Ptolemy," and was held to be first of Arabian astronomers.

ALBATROSS (*Diomedea*), a genus of web-footed birds of the family of the *Laridæ*, nearly allied to gulls and petrels. Their feet have no hind-toe nor claw; they have a large strong beak—the upper mandible, with strongly marked sutures, and a hooked point. The common A. (*D. exulans*), also called the wandering A., is the largest of web-footed birds, the spread of wing being sometimes 12 ft., and the weight 20 lbs. or upwards. The wings are, however, narrow in proportion to their length. This bird is often seen at a great distance from land, and abounds in the southern seas, particularly near the cape of Good Hope, whence sailors sometimes call it the cape sheep. It often approaches very near to vessels, and is one of the objects of interest which present themselves to voyagers far away from land, particularly when it is seen sweeping the surface of the ocean in pursuit of flying-fish. It seems rather to float and glide in the air than to fly like other birds, as, except when it is rising from the water, the motion of its long wings is scarcely to be perceived. The plumage is soft and abundant, mostly white, dusky on the upper parts, some of the feathers of the back and wings black. The bill is of a delicate pinky-white, inclining to yellow at the tip. The A. is extremely voracious; it feeds chiefly on fish and mollusca, but has no objection to the flesh of a dead whale, or to any kind of carrion. It is not a courageous bird, and is often compelled to yield up its prey to sea-eagles, and even to the larger kinds of gulls. When food is abundant, it gorges itself, like the vultures, and then sits motionless upon the water, so that it may some-

times be taken with the hand. Not unfrequently, however, on the approach of a boat, it disgorges the undigested food, and thus lightened, it flies off. Its cry has been compared to that of the pelican; it also sometimes emits a noise which has been likened to the braying of an ass. Its flesh is unpalatable. It heaps up a rude nest of earth not far from the sea, or deposits its solitary egg in a slight hollow which it makes in the dry ground. The egg is about 4 in. long, white, and spotted at the larger end; it is edible. There are seven species of this genus. One of these (*D. fuliginosa*), chiefly found within the antarctic circle, is called by sailors the Quaker bird, on account of the prevailing brown color of its plumage. Albatrosses appear in great numbers towards the end of June, about the Kurile islands and Kamtchatka. The Kamtchadales take them by baited hooks, blow up the entrails for floats to their nets, and make tobacco-pipes and various domestic articles of the wing-bones. See *illus.*, ANTELOPES, ETC., vol. I.

ALBAY, a t. of the island of Luzon, Philippine islands, the capital of a province of the same name, in the s. end of the island. It is situated about 2 m. from the bay of Albay, which is an excellent harbor, and very near a volcano also called Albay, which is in a state of constant activity. Earthquakes are frequent, but the province is very fertile. The t. is regularly built, and is a place of considerable trade. Pop., about 13,000.

ALBE, or **ALB** (Lat. *albus*, white), the long white linen vestment worn in early times by all ecclesiastics at divine service. It differed from the more modern surplice (q.v.), which is only a modification of it, in having narrower sleeves. At the foot and wrists were embroidered ornaments called *apparels*. In the ancient church newly baptized persons were obliged to wear a similar garment for eight days; and hence catechumens were called *albat*; and the Sunday after Easter, on which they usually received baptism, came to be called dominica in albis. See *WHITSUNTIDE*.

ALBEMARLE, a co. in Virginia, e. of the Blue Ridge and n. of James river, intersected by the Chesapeake and Ohio, and the Southern railroads; 675 sq. m.; pop. '90, 32,379, inclu. colored. It has an undulating surface and rich bottom lands. Co. seat, Charlottesville.

ALBEMARLE, GEORGE MONK, Duke of, 1608-70; an English general, chief agent in the restoration of the Stuarts in 1660. In 1625 he was in the expedition against Spain; served ten years in the Netherlands; was lieutenant-col. in the campaign against the Scots; led a regiment against the Irish; and was governor of Dublin until the peace in 1643. Next year in the civil war he was made prisoner by Fairfax, and kept two years in the Tower, but was released on taking the covenant. Cromwell made him lieutenant-gen. and chief of artillery, and for good service at Dunbar raised him to gen.-in-chief in Scotland. He took part in the commission to arrange the union of Scotland and England, and went to the former country as governor in 1654, with much difficulty maintaining his rule against the Presbyterians. Charles tried to secure his support, but Monk sent the letter to Cromwell, after whose death Monk declared in favor of Richard Cromwell, assuming the defence of public order. On the 1st of Jan., 1660, Monk crossed the border with 6000 men, joined Fairfax at York, and entered London Feb. 3 without opposition. His intentions were not known until Feb. 28, when he called together the Presbyterian members expelled from parliament in 1648, and created a majority for the king, and Charles was formally declared on the 8th of May. Charles made Monk duke of Albemarle, privy-councilor, chamberlain, and lord lieutenant of Devon and Middlesex. In 1666 he commanded the naval expedition against Holland and was beaten by De Ruyter at Dunkirk, in his turn defeating the Dutchmen at North Foreland.

ALBEMARLE SOUND, an inlet in the coast of North Carolina, 60 m. long and 4 to 15 wide, separated from the ocean by an island, and not appreciably affected by the tides. It receives the Roanoke and Chowan rivers and is connected with Currituck and Pamlico sounds by natural channels, and with Chesapeake bay by the Dismal Swamp canal. Having only shallow water, the sound is of little value for navigation.

AL'BER, MATTHEW, 1495-1570; one of the promoters of the reformation, preaching at Reutlingen. He was put under ban by the pope and the imperial court, but went on preaching, strongly supported by the people. He rejected Latin, and used the native tongue in church services, put out the images, and took a wife. He was summoned before the imperial chambers and charged with nearly 70 distinct heresies, to all of which, save that of speaking disrespectfully of the mother of Christ, he confessed guilty. He was tried, but set free without punishment. A. was a friend and ally of Luther. Some of his sermons, a catechism, and a work on *Providence* have been published.

ALBERIC I., a Roman ruler in the beginning of the 10th c.; son of a Lombard nobleman. He married Marozia, daughter of the notorious Theodora, who held the temporal authority, and by union with her he came to be ruler. He joined pope John X. in expelling the Saracens, and ruled the duchy of Spoleto; but the pope banished him from Rome and he was murdered in 925. His widow married Guido of Tuscany, and after his death, Hugo, king of Italy, whom her son Alberic II. expelled.

ALBERIC II., son of Alberic I., a wise Roman ruler who died in 954, after a reign of 23 years. He was succeeded by his son Ottaviano, afterwards pope John XII., in 956.

ALBERONI, GIULIO, CARDINAL, the son of a poor vine-dresser, was born on the 31st of May, 1664, at Firenzuola in Parma. From being merely a chorister in a church at Piacenza, he quickly rose, through his abilities, to the dignity of chaplain and favorite of count Roncovieri, bishop of St. Donino. He was afterwards sent to Madrid as *chargé d'affaires*, by the duke of Parma, where he gained the favor of Philip V. of Spain, and had the honors successively conferred on him of grandee, cardinal, and prime-minister. In this last capacity he was of singularly great service to Spain, overthrowing the intriguing family of Ursini, bringing about the second marriage of Philip V. with Elizabeth Farnese, and stimulating the expiring energies of Spain. A new life dawned upon the nation, which learned to forget the hardships it had suffered in the Spanish wars of succession; although, on the other hand, it must be admitted that it was principally through his instrumentality that the last liberties and rights of the people were sacrificed in favor of absolutism. He was ambitious, and ambition is always despotic and unscrupulous; hence, to gratify the covetous desires of his new mistress, he suddenly invaded Sardinia, in violation of the peace of Utrecht, cherishing the hope of re-establishing the monarchy of Charles V. and Philip II., and startling Europe by his insolent audacity. The regent of France broke off his alliance with Spain, and united himself with England and the emperor; but A. was not dismayed. Even when the Spanish fleet in the Mediterranean was destroyed by an English one, he contemplated an extensive war by land, in which all the European powers would have been entangled. He patronized the pretender, to annoy England, and the French Protestants, to annoy Louis. He sought to unite Peter of Russia and Charles XII. with him, to plunge Austria into a war with the Turks, to stir up an insurrection in Hungary, and, through his influence with one of the parties at the French court, he actually accomplished the arrest of the regent himself (the duke of Orleans). But so universal became the complaints against A., that Philip lost courage, and concluded a treaty of peace, the chief condition of which was that the cardinal should be dismissed, which was effected through the influence of Elizabeth herself, now weary of the arrogance of her late favorite. In 1719 Alberoni received a command to quit Madrid within 24 hours, and the kingdom within 5 days. Exposed to the vengeance of every power whose hatred he had drawn upon himself, he knew no land where he could remain. Not even to Rome could he venture, for Clement was more bitterly inimical to him than any secular potentate. He wandered about in disguise, and under fictitious names. At length he was imprisoned in the Genoese territory, through the solicitation of the pope and the Spanish monarch; but he speedily recovered his liberty, and two years after the death of Clement, was reinstated by Innocent XIII. in all the rights and dignities of a cardinal. In 1740 he retired to Piacenza, where he died twelve years after (June 16, 1752) at the age of 88. He bequeathed his possessions in Lombardy to Philip V., while his cousin and heir, Cæsar A., became possessor of 1,000,000 ducats.

ALBERS, JOHANN FRIEDRICH HERMANN, 1805-67; a German physician, professor of pathology at Bonn. He established there an asylum for the treatment of insanity and nervous diseases; and was director of the pharmacological cabinet. His anatomical atlas and works on various branches of medical science are regarded as authority.

ALBERT, a co. in s.e. New Brunswick, on the bay of Fundy; 677 sq.m.; pop. '91, 10,971. The land is good, with bituminous and cannel coal, oil-bearing shales, plaster, and freestone. Coal and plaster are sent to the United States. Chief t., Hopewell Cape.

ALBERT, archbishop of Magdeburg, and elector of Mentz, generally called A. of Brandenburg, younger son of the elector, John Cicero of Brandenburg, was b. in 1490. In 1513 he became archbishop of Magdeburg; in the same year, also, administrator of the bishopric of Halberstadt, and in the following year, archbishop and elector of Mentz. Leo X. having granted him permission to sell indulgences, on condition that he should deliver up half the booty to the papal exchequer, A. appointed the Dominican Tetzels "indulgence-preacher," who, by the shameless manner in which he went about his work, first stirred Luther to post up his well-known ninety-five theses. Even in the archbishop's own diocese, the reformer's doctrines found not a few adherents, so that A. was compelled, at the imperial diet at Augsburg, to act the part of peacemaker. When he joined the holy alliance against the treaty of Schmalkald, Luther made a fierce attack on him in writing. He was the first of all the German princes who received the Jesuits into his dominions. In 1541, he granted religious liberty to his subjects, under the condition that they should pay his debts, amounting to 500,000 florins. He did this, not from any love of religious liberty, but either because of the consideration referred to, or from a dread of popular compulsion. The last days of his life were spent in Aschaffenburg, where he d. in 1545.

ALBERT, count of Bollstädt, usually called Albertus Magnus, also Albertus Teutonicus, a man less distinguished for originality than for the extent of his acquirements and his efforts for the spread of knowledge, especially of the works and doctrines of Aristotle, was b. at Lauingen, in Swabia, in 1205, or, as some say, in 1193. After finishing his studies at Padua, he entered the order of the Dominican friars, and taught in the schools of Hildesheim, Ratisbon, and Cologne, where Thomas Aquinas became his pupil. He afterwards repaired to Paris, where he publicly expounded the doctrines of Aristotle, in spite of the prohibition of the church. In 1249, he became rector of the school at

Cologne; and in 1254, provincial of the Dominican order in Germany. In 1260, he received from Pope Alexander IV. the bishopric of Ratisbon. But in 1262, he retired to his convent at Cologne, to devote himself to literary pursuits; and here he composed a great number of works, especially commentaries on Aristotle. He had fallen into dotage some years before his death, which occurred in 1280. The fullest edition of his works was prepared by Pierre Jammy, the Dominican (21 vols., Lyon and Leyden, 1651); but it is far from being complete. Many of the writings attributed to A. seem to be spurious; among others, that entitled *De Secretis Mulierum*, which was widely circulated during the middle ages. The extensive chemical and mechanical knowledge which A. possessed, considering the age in which he lived, brought upon him the imputation of sorcery; and in German tradition he has a very ambiguous reputation. It is recorded, for instance, that in the winter of 1240, he gave a banquet at Cologne to William of Holland, king of the Romans; and that during the entertainment the wintry scene was suddenly transformed into one of summer bloom and beauty. This myth rests most likely on the fact of A. having had a greenhouse. The scholastics who followed A.'s opinions took the name of *Albertists*. His best known works are *Summa Theologicæ* and *Summa de Creaturis*.

ALBERT, last grand-master of the Teutonic order, and first duke of Prussia, was b. in 1490. He was the son of the margrave Frederic of Anspach and Baireuth, who, having several children, wished to make him enter the church. He was educated under the care of Archbishop Hermann, of Cologne, where he became canon. He did not, however, neglect knightly exercises. He accompanied the emperor Maximilian I. in his expedition against Venice, and was present at the siege of Pavia. In 1511, when scarcely 21 years old, he was chosen grand-master of the Teutonic order, the knights expecting their feudal allegiance to Poland to be abolished, on account of his near relationship to Sigismund, the monarch of that country, while they also hoped for protection against the latter from his friends in Germany. He was consecrated at Mergentheim with his father's consent. In 1512 he removed to Königsberg, having been acknowledged by Poland likewise; but refusing to take the oath of allegiance, he was plunged into a war with Sigismund in 1520. The year after, a four years' truce was agreed to at Thorn. A. next made his appearance at the imperial diet at Nürnberg, as a German prince of the empire, to induce the other princes to assist him against the Poles. But Germany could at that time grant no assistance to any one. Disappointed in his hopes, A. threw himself into the cause of the reformation, which had rapidly spread into Prussia, and broken the last strength of the declining order, whose possessions now appeared a certain prey to Poland. A. still hoped to preserve these, by acting upon Luther's advice, which was, to declare himself secular to the duke of Prussia, and place his land under the sovereignty of Sigismund. This was done with great pomp at Cracow, on the 8th April 1525, the duchy being secured to him and his descendants. During the remainder of his life, A. zealously sought to further the welfare of his duchy. He regulated the administration of all affairs, both secular and ecclesiastical, established the ducal library, founded in 1543 the university of Königsberg, gathered many literary men around him, and caused their works to be printed. In 1527, he married Dorothea, daughter of Frederick, king of Denmark. A. earnestly desired peace, but his was not an age in which peace could be purchased. The transition period from the old to the new is always violent, and the duke found himself entangled in conflicts with the nobles, and in theological disputes, which, along with other crosses of a more personal character, saddened the close of his life. He d. in 1568. See PRUSSIA.

ALBERT, or **ALBRECHT**. Five sovereign dukes of Austria (q.v.) bore this name, of whom two (I. and V.) were also emperors of Germany. A. I., duke of Austria and emperor of Germany, was the eldest son of Rudolph I., and born in the year 1248. Rudolph, about the close of his career, made an effort to have A. appointed his successor; but the electors, tired of his authority, and emboldened by his age and infirmities, refused to comply with his request. After Rudolph's death, Austria and Styria revolted; but A., having vigorously crushed the insurrection, had the audacity to assume the insignia of the empire without waiting for the decision of the diet. This violent measure induced the electors to choose, in preference to him, Adolphus of Nassau. Disturbances in Switzerland, and a disease which cost him an eye, now rendered him more humble; he delivered up the insignia which he had so rashly assumed, and took the oath of allegiance to the new emperor, who, however, after some years, so completely disgusted his subjects, that A. began to entertain hopes of recovering his imperial dignity. In 1298, Adolphus was deposed, and A. elected; but the former having resolved to maintain his title, A. was obliged to fight for the crown. The rivals drew up their forces near Worms, where a battle ensued, in which Adolphus was defeated and slain. A., feeling that he might now safely display magnanimity, voluntarily resigned the crown which had been recently conferred upon him; and, as he had anticipated, was unanimously re-elected. His coronation took place at Aix-la-Chapelle, in August, 1298. But the pope, Boniface VIII., denied the right of the princes to elect A., declared himself the only true emperor and legitimate king of the Romans, summoned the former before him, required him to ask pardon and do penance, forbade the princes to acknowledge him, and released them from their oath of allegiance. A., on the other hand, with his usual intrepidity, defied his holiness, formed an alliance with Philip the fair of France, secured the neutrality

of Saxony and Brandenburg, invaded the electorate of Metz, and forced the archbishop to break off his alliance with Boniface and to form one with himself for the next five years. The pope was alarmed by his success, and entered into negotiations with him. A., whose duplicity and unscrupulousness equaled his courage, suddenly broke off his alliance with Philip, admitted the western empire to be a papal grant, and declared that the electors derived their right of choosing from the holy see. Moreover he promised upon oath to defend the rights of the Romish court whenever he was called upon. As a reward, Boniface gave him the kingdom of France, excommunicating Philip, and declaring him to have forfeited the crown; but the latter severely chastised the pope for his insolence in daring to give away what was not his own. In the following year, A. made war unsuccessfully against Holland, Zealand, Friesland, Hungary, Bohemia, and Thuringia. Shortly afterwards, news reached him that a rebellion had broken out amongst the Swiss in Unterwalden, Schweitz, and Uri, in Jan., 1308. A. had not only foreseen, but desired this, in order that he might find a pretext for completely subjugating the country. A new act of injustice, however, occasioned a crime which put an end to his ambition and life. His nephew, Duke John, claimed Swabia as his rightful inheritance, and had set his claims before A., but in vain. When the latter was departing for Switzerland, the former renewed his demand. A. scoffingly refused; and duke John resolved to be revenged. Along with four others, he conspired against his uncle's life, and assassinated him on the way to Rheinfelden, while separated from his followers by the river Reuss. The emperor expired May 1, 1308, in the arms of a beggar-woman sitting by the wayside—a spectacle calculated to excite stern reflection on the vanity of human ambition. His daughter Agnes, queen of Hungary, frightfully revenged her father's death. See JOHN, THE PARRICIDE. A. left five sons and five daughters, the children of his marriage with Elizabeth, daughter of the count of Tyrol.

ALBERT, or **ALBRECHT**, Archduke of Austria, b. in 1559, was the third son of the emperor Maximilian II. He was brought up at the Spanish court, and dedicated himself to the church. In 1577 he was made cardinal, in 1584, archbishop of Toledo, and during the years 1594–96, held the office of viceroy of Portugal. He was next appointed stadtholder of the Netherlands, where he continued, until his death, the representative of the Spanish monarch, discharging the duties of his function with prudence and dignity. Cardinal Bentivoglio, who resided a considerable time at his court, praises his uprightness, his moderation, his love of serious study, his industry, his perseverance, and his discretion, though he does not conceal the fact that he was a prince better fitted for peace than for war. He displayed at first both courage and enthusiasm, but afterwards he was accused of dilatoriness and timidity. Meanwhile, he did not receive from Spain the promised help; and, moreover, affairs had reached such a pitch, that they could hardly become worse. A., however, did the best that could be done. His mild, moderate, and unpersecuting character, essentially contributed to the re-establishment of the Spanish authority in the Netherlands. Philip employed him to mediate amid the disturbed provinces. A. now abandoned his ecclesiastical profession, and married (1598) the infanta, Isabella, who received the Netherlands for her dowry. He d. in 1621.

ALBERT, **ALEXANDER MARTIN**, a member of the provisional government of France after the revolution of Feb., 1848, was b. at Bury (Oise) in 1815. His father was a peasant, and he himself learned a mechanical trade at Paris. He took part in the revolution of July, 1830, and was implicated in the celebrated trial of 1834; after which he devoted himself to the study and discussion of political questions, yet not abandoning his workshop. He commenced at Lyon the republican journal called *La Glaneuse*, on account of which he was condemned to a fine of 5000 francs when the insurrection broke out at Lyon. In 1840 he began *L'Atelier*, a paper conducted exclusively by operatives, and devoted to their interests. On the evening before the proclamation of the republic in Feb., 1848, he was making buttons in his workshop; and on the nomination of Louis Blanc, he was called to take part in the provisional government. He was afterwards chosen president of the commission for national rewards; but he soon resigned this post. He was elected by a large majority of voices as the representative of the department of the Seine in the national assembly; but involving himself in the attempt of May 15, 1848, against the government as it then existed, he was arrested, and sentenced to transportation. He was, however, soon liberated. D. May 28, 1895.

ALBERT, **FRANCIS (ALBERT) AUGUSTUS-CHARLES-EMMANUEL**, Prince of Saxe-Coburg-Gotha, consort of Victoria, queen of Great Britain, b. Aug. 26, 1819, was the second son of the late duke of Saxe-Coburg-Gotha, by his first marriage with Louisa, daughter of the duke of Saxe-Gotha-Altenburg. The prince, after a careful domestic education, along with his elder brother, the reigning duke, attended the university of Bonn, where, in addition to the sciences connected with state-craft, he devoted himself with ardor to the study of natural history and chemistry, and displayed great taste for the fine arts, especially painting and music. Several compositions of his obtained publicity, and an opera was afterwards performed in London, said to have been composed by him. Gifted with a handsome figure, he attained expertness in all knightly exercises. It was this accomplished prince that the young queen of Great Britain selected as her partner for life. The marriage was celebrated in London on the 10th of Feb, 1840. On his marriage, Prince Albert received the title of royal highness, was naturalized as a subject of Great

Britain, and obtained the rank of field-marshal, the knighthood of the order of the bath, and the command of a regiment of hussars. As the union proved, in the highest degree, a happy one, the prince was loaded with honors and distinctions both by the queen and the nation. The title of consort of her most gracious majesty was formally conferred in 1842, and that of prince consort, in 1857, made him a prince of the United Kingdom. He was also made a member of the privy council, governor and constable of Windsor Castle, colonel of the grenadier guards, acting grand-master of the Order of the Bath, chancellor of the university of Cambridge, master of the Trinity House, etc. Notwithstanding his high and favored position, the prince, with rare prudence and tact, abstained from meddling with state affairs, and thus escaped the jealousy and detraction of parties. When the whig ministry of 1840 proposed for him the income of £50,000, as consort of Queen Victoria, the tories, in conjunction with the radicals, succeeded in limiting the sum to £30,000. This appears to have been the only instance of any manifestation of party feeling with reference to the prince. On the other hand, he opened for himself an influential sphere of action, in the encouragement and promotion of science and art, appearing as the patron of many useful associations and public undertakings. The exhibition of 1851 owed much to the prince. He d. 14th Dec., 1861. See *Life* by Theodore Martin (5 vols., 1874-80), and Vitzthum's *Reminiscences* (Eng. trans. 1887).

ALBERT, FREDERICK RUDOLPH, 1817-95; Archduke of Austria, son of archduke Charles, and grandson of Leopold II.; first cousin of the father of the reigning emperor. He was distinguished in youth as a cavalry commander, doing good service in the battle of Novara, in 1849. He was governor of Hungary, 1851-60; in 1866 he commanded the Austrians in Venetia, and won the victory of Custoza, June 24; but Benedek's defeat at Sadowa, July 3, made his success of no account. He became field-marshal and inspector general of the Austrian army. A. married, May 1, 1844, Archduchess Hildegard, daughter of Ludwig I. of Bavaria. She d. April 2, 1864.

ALBERT, FRIEDRICH AUGUST; b. April 23, 1828, reigning king of Saxony, son of king John and queen Amélie. He was a general in the Schleswig-Holstein war, and after his father's accession in 1854 presided over the council of state. In 1866 he commanded the Saxon army coöperating with the Austrians against Prussia, and received a decoration for the behavior of his troops. On the union of Saxony with the n. German confederation, this force became the 12th corps of the n. German army, and with them the prince won high honors at Gravelotte and Sedan, receiving the Prussian iron cross and the command-in-chief of the newly formed 4th army, at the head of which he entered Paris with the emperor and the German princes. He married, June 18, 1853, Caroline Frédérique Françoise Stéphanie Amélie Cécile, daughter of Gustavus, prince of Vasa.

ALBERT EDWARD, PRINCE OF WALES, b. Nov. 9, 1841; heir-apparent of the British throne, eldest son and second child of Victoria and Albert. He is duke of Cornwall, according to the statute of 1337, with annual revenue of about \$250,000. He was created Prince of Wales in 1841, and earl of Dublin in 1850; is high steward of Scotland, duke of Rothsay, earl of Carrick, baron of Renfrew, and Lord of the Isles. He is also a Knight of the Garter, general in the army, and colonel of the 10th hussars. His early education was under Rev. Henry Birch, rector of Prestwich; Mr. Gibbs, barrister; Rev. C. F. Tarvex, and H. W. Fisher. He visited Canada and the United States in 1860; joined the camp at Curragh in June, 1861; traveled in 1862 in the east with Dean Stanley, visiting Jerusalem; and in 1875-76 made a tour of India. He married March 10, 1863, Princess Alexandra, daughter of Christian IX., king of Denmark. Their children are: 1. Prince Albert Victor Christian, duke of Clarence, b. 1864, d. 1892; 2. Prince George Frederick Ernest Albert, b. June 3, 1865; 3. Princess Louise Victoria Alexandra Dagmar, b. Feb. 20, 1867; 4. Princess Alexandra Olga Mary, b. July 6, 1868; 5. Princess Maud Charlotte Mary Victoria, b. Nov. 26, 1869. Prince A. was chosen grand-master of free-masons in 1867, succeeding the marquis of Ripon.

ALBERT, EUGEN D', pianist, born at Glasgow, Scotland, April 10, 1864. He was the son of Charles d'Albert, a French dancing-master, studied under Sir Arthur Sullivan, Prout, and Pauer in London, under Hans Richter in Vienna, under Liszt in Weimar, and in 1881 made his first appearance at a Philharmonic concert in Vienna, achieving brilliant success. He was soon made court pianist in Weimar, traveled in Europe, and came to America in the season of 1889-'90. His mastery of technique, intellectual interpretation, force, and fire class him with Rubinstein, Liszt, and von Bülow, as one of the four greatest pianists of the century. His compositions include pianoforte music, a suite, symphony, and overture for the orchestra, a quartet for strings, and several songs.

ALBERTA, a district in Canada, formed in 1882 out of the n.w. territory, containing about 106,000 sq.m. It is bounded on the n. by Athabasca, on the e. by Saskatchewan and Assiniboia, on the s. by the U. S., and on the w. by British Columbia. A. is the cattle-ranche district, containing the Belly, Battle, and Bow rivers. Principal places, 1883, Edmonton, Rocky Mountain House, Victoria, Fort Saskatchewan, Hamilton, Calgary, Old Bow. The new districts, A., Athabasca, Saskatchewan, and Assiniboia, have as their capital, Regina in the latter district. The Canadian Pacific railroad passes through the s. portion of A. Pop. 1891, 25,277.

ALBERT LEA, seat of justice of Freeborn co. Minnesota, is situated between two lakes, one of which bears its name, about 100 m. s. of St. Paul. It was settled in 1855, and incorporated in 1878, and is reached by the Chicago, Milwaukee and St. Paul and other railroads; has waterworks, electric lights, an academy, Albert Lea college, and is principally engaged in manufacturing, dairying, and grain and stock raising. Pop. '90, 3305.

ALBERT MEDAL, a decoration instituted in England (1866) to reward heroic acts in saving life at sea. In 1877 it was extended to acts of gallantry in preventing loss of life in perils on land.

ALBERT N'YANZA (the Little Luta Nzige of Speke), a large lake of e. central Africa, one of the reservoirs of the Nile, situated in a deep rock-basin, 80 m. w. of the Victoria N'yanza. The A. N. is of an oblong shape, and, as proved by M. Gessi, one of colonel Gordon's party in 1876, is 100 m. long from n. to s., and 25 m. broad. It is crossed by the equator near its centre. On the e. it is fringed by precipitous cliffs, having a mean alt. of 1500 ft., with isolated peaks, rising from 5000 to 10,000 ft. The surface of the lake is 2720 ft. above the sea, and 1470 ft. below the general level of the country; its water is fresh and sweet, and it is of great depth toward the centre. The n. and w. shores of the lake are bordered by a massive range of hills, called the Blue mountains, which have an elevation of about 7000 ft. The existence of this vast lake first became known to Europeans through Speke and Grant, who, in 1863, heard the Luta Nzige described by the natives as only a narrow reservoir forming a shallow back-water of the Nile. When Speke and Grant, after the discovery of the Victoria N'yanza, were, in 1863, descending the Nile on their return to Europe, they met, at Gondokoro, Mr. (now Sir) Samuel White Baker (q.v.), who was ascending the river in the hope of meeting with and aiding these travelers. As soon as they informed him of the reputed great lake, Baker agreed to undertake its exploration. Joining a trading party, he traveled south-eastward to Latooka, which he describes as the finest country he had seen in Africa. His course was now s. and s.w., through the countries of Obbo and Madi, crossing the Asua, a tributary of the Nile, on 9th Jan., 1864. Journeying next in a s. and south-eastward direction over uninhabited prairies and swampy hollows, he came upon the Nile at the Karuma falls, lat. 2° 17' n., at the identical spot where it had been crossed by Speke and Grant. Being prevented, by the jealousy of king Kamrasi, from following the course of the stream to the westward, he was forced to proceed, by slow marches southward on the w. side of the Somerset or Nile, to M'rooli, leaving which, his course lay s.w. on the s. side of the Kafoor river. After a toilsome march of 18 days from M'rooli, the party came in sight of the glorious expanse of water, which Baker named in honor of Prince Albert who was but recently dead.

The spot where the party first reached the lake, Vacovia, is in lat. 1° 14' n., 30° 40' e. Embarking thence in canoes, the party coasted north-eastward, and in 13 days arrived at Magungo, lat. 2° 16' n., near the mouth of the Somerset river. At this part, the lake was under 20 m. in width, and appeared to stretch away in a n.w. direction. From Magungo, 250 ft. above the lake, the travelers had a view of the Nile valley for 15 or 20 m. northwards. Ascending the Somerset, at a distance of 25 m. from its mouth, the canoe-voyage was interrupted by a grand cataract 120 ft. high, which was named the Murchison falls. The explorers proceeded south-eastwards for about 30 m. to Kisoonna, and then a march n.e. for about the same distance brought them to the Karuma falls, where they first entered the lake-region. The name Somerset is adopted from Speke's first map, in order to distinguish that river from the Nile proper. It issues from the Victoria N'yanza at the Ripon falls, and flowing n.w. and w. for about 230 m., it enters the A. N. within 30 m. of its northern extremity, and soon quits it to form the true Nile. From the Ripon falls for 30 m. n., and from the Karuma to the Murchison falls, 45 m., the Somerset forms a series of rapids. The A. N. receives the drainage of a great equatorial mountain range, where rain falls during 10 months of the year. In 1887, Emin Pasha reported that he had discovered two rivers, the Nyussi-Msisi and the Due-ru, flowing into the lake from the southwest, and that the latter, the larger of the two, discharges a considerable quantity of water into the lake all the year round. In 1876 two steamers were placed by Gordon Pasha on Albert Nyanza. The scenery of the lake is described as extremely beautiful. Salt, which is very abundant in the soil on the eastern shores of the lake, is now the only article of trade to the inhabitants.

ALBERT THE BEAR (so called, not from any peculiarity of character or appearance, but from the heraldic cognizance that he assumed), margrave of Brandenburg, one of the most remarkable princes of his age, was b. 1106. He was the son and successor of Otho, the rich count of Ballenstädt, and of Elica, eldest daughter of Magnus, duke of Saxony. Having proved faithful to the emperor Lothario, he received from the latter Lusace, to be held as a fief of the empire; but the duchy of Saxony, to which he had the best claim, was given to Henry of Bavaria (1127), the son of the youngest daughter of the duke. As a compensation, A. was made margrave (markgraf) of the northern march or mark (Salzwedel); but in the year 1138, Henry having been put under the imperial ban, the duchy reverted to the former, when he took the title of duke of Saxony. Henry, however, again got the upper hand, and A. was compelled to fly, and to content himself with the margraviate of northern Saxony, and the government of Swabia, which was given him as an indemnity. Returning to his own country, he got himself invested with the lands which he had conquered from the Wends as a hereditary fief of the empire, and thus became the founder and first margrave of the new state of Brandenburg. Under

A. the margravedom was afterwards raised to be an electorate, and he himself became elector of Brandenburg. After he had quelled a revolt of the Wends in 1157, he determined to take extreme measures against the vanquished. He almost depopulated their country, and then colonized it with Flemings. On his return from a pilgrimage to Palestine in company with his wife in 1159, he exerted himself to suppress the language and paganism of the Wends, and to introduce Christianity amongst them. He died in 1170.

ALBERTUS MAGNUS. See **ALBERT OF BOLLSTADT.**

ALBI, capital of the department of Tarn in France, is built on a height. It is very old, and suffered greatly during the religious wars which devastated the land in the time of the Albigenes. Besides the usual government offices, it possesses a public library of 12,000 volumes, and a museum. The chief buildings are the cathedral, built in the style of the 13th c., the old palace of the count of Albigeois, and the theater. There is considerable trade in corn, wine, fruit, etc., and linen, cotton, woollen, and leather manufactures. Pop. about 14,200.

ALBIGENSES is a name applied loosely to the "heretics," belonging to various sects, that abounded in the s. of France about the beginning of the 13th c. The chief sect was the Cathari (q.v.); but they all agreed in renouncing the authority of the popes and the discipline of the Romish church. The name arose from the circumstance that the district of Albigeois in Languedoc—now in the department of Tarn, of which Albi is the capital—was the first point against which the crusade of Pope Innocent III. 1209, was directed. The immediate pretense of the crusade was the murder of the papal legate and inquisitor, Peter of Castelnau, who had been commissioned to extirpate heresy in the dominions of count Raymond VI. of Toulouse; but its real object was to deprive the count of his lands, as he had become an object of dislike from his toleration of the heretics. It was in vain that he had submitted to the most humiliating penance and flagellation from the hands of the legate Milo, and had purchased the papal absolution by great sacrifices. The legates, Arnold, abbot of Citeaux and Milo, who directed the expedition, took by storm Beziers, the capital of Raymond's nephew, Roger, and massacred 20,000—some say 40,000—of the inhabitants, Catholics as well as heretics. "Kill them all," said Arnold; "God will know his own!" Simon, count of Montfort, who conducted the war under the legates, proceeded in the same relentless way with other places in the territories of Raymond and his allies. Of these, Roger of Beziers died in prison, and Peter I. of Aragon fell in battle. The conquered lands were given as a reward to Simon of Montfort, who never came into quiet possession of the gift. At the siege of Toulouse, 1218, he was killed by a stone, and counts Raymond VI. and VII. disputed the possession of their territories with his son. But the papal indulgences drew fresh crusaders from every province of France, to continue the war. Raymond VII. continued to struggle bravely against the legates and Louis VIII. of France, to whom Montfort had ceded his pretensions, and who fell in the war in 1226. After hundreds of thousands had perished on both sides, a peace was concluded, in 1229, at which Raymond purchased relief from the ban of the church by immense sums of money, gave up Narbonne and several lordships to Louis IX., and had to make his son-in-law, the brother of Louis, heir of his other possessions. These provinces, hitherto independent, were thus, for the first time, joined to the kingdom of France; and the pope sanctioned the acquisition, in order to bind Louis more firmly to the papal chair, and induce him more readily to admit the inquisition. The heretics were handed over to the proselytizing zeal of the order of Dominicans, and the severe tribunals of the inquisition; and both used their utmost power to bring the recusant A. to the stake, and also, by inflicting severe punishment on the penitent converts, to inspire dread of incurring the church's displeasure. From the middle of the 13th c., the name of the A. gradually disappears. The remnants of them took refuge in the east, and settled in Bosnia.

ALBINOS—called also *Leucæthiopes*, or white negroes, and by the Dutch and Germans *kakerlaken*—were at one time considered a distinct race; but closer observation has shown that the same phenomenon occurs in individuals of all races, and that the peculiar appearance arises from an irregularity in the skin, which has got the name of *leucopathy* or *leucosis*. It consists in the absence of the coloring matter which, in the normal state, is secreted between the cuticle and the true skin, and also of the dark pigment of the eye; so that the skin has a pale, sickly white color, while the iris of the eye appears red, from its great vascularity. As the pigment in the coats of the eye serves to diminish the stimulus of the light upon the retina, A. generally cannot bear a strong light; on the other hand, they see better in the dark than others. The coloring matter of the hair is also wanting in A., so that their hair is white. All these differences are of course more striking in the darker varieties of the species, and most of all in the negro albinos.

Albinoism is always born with the individual, and occurs not only in men, but also in other mammalia, in birds, and probably in insects. It is not improbable that the peculiarity may, to some extent, be hereditary. The opinion that A. are distinguished from other men by weakness of body and mind, is completely refuted by facts.

ALBION is the most ancient name on record of the island of Great Britain. See **ALBANY** or **ALBAINN.**

ALBION, the seat of justice of Orleans co., N. Y., 30 m. w. of Rochester; pop. '90, 5773. The Erie canal and Niagara branch of N. Y. Central railroad pass through it. There are sandstone quarries, manufactures of agricultural implements, shoes, carriages, etc.

ALBION, *NEW*, the name given by Sir Francis Drake to California, which he visited in 1578; but later restricted by Humboldt and other geographers to that part of the n.w. coast lying between 43° and 48° n.

ALBIR CO, a double star in the head of the swan; interesting to spectroscopists for the different color lines of its components; the larger star is orange and the smaller one blue.

ALBITE (Lat., *albus*, white), name given to soda-feldspar.

AL BOIN, the founder of the Lombard dominion in Italy, succeeded his father in 561 A.D., as king of the Lombards, who were at that time settled in Pannonia. His thirst for action first vented itself in aiding Narses against the Ostrogoths; and afterwards, in a war with the Gepidæ, whom he, in conjunction with the Avari, defeated in a great battle (566), slaying their king Cunimond with his own hand. On the death of his first wife, Klodoswinda, he married Rosamond, daughter of Cunimond, who was his prisoner. Some of his warriors, who had accompanied Narses into Italy, brought back reports of the beauties and riches of the country. This determined A., in 568, to enter Italy with his own nation of Lombards, the remains of the Gepidæ, and 20,000 Saxons. He soon overran and subdued the n. of the country as far as the Tiber, fixing his principal residence at Pavia—which long continued to be the capital of the Lombards; when his barbarity cost him his life. During a feast at Verona, he made his queen drink out of the skull of her father, which he had converted into a wine-cup. In revenge, she incited her paramour to murder her husband, who fell 574. Strangely enough, A. was a just and beneficial ruler. He was beloved by his subjects, whom he stimulated into that vital activity that characterized their descendants for ages. For several centuries, his name continued to be illustrious among the German nations, who celebrated his praises in martial songs. To escape the fury of the Lombards, Rosamond fled with her associate and the treasure to Longinus, the exarch, at Ravenna. Longinus becoming a suitor for her hand, she administered poison to Helmichis, her paramour, who, discovering the treachery, caused her to swallow the remainder of the cup, and die with him.

ALBO NI, *MARIETTA*, b. Mar. 10, 1823; an Italian contralto, pupil of Rossini. She made her début at the age of 15 at the Communal Theatre of Bologna, where her success led to an engagement at La Scala, Milan. She made rapid progress, and in 1846-47 sang in all the principal cities of Europe, in London at Covent Garden in rivalry with Jenny Lind, who was at her Majesty's Theatre. In 1852 she visited the United States, remaining over a year, and singing in the chief towns in opera and concert. Her celebrity was owing to the power, fine quality, flexibility, and compass of her voice, a true contralto compassing 2½ octaves, and ranging as high as a mezzo-soprano, her florid style gaining great effect from her vivacity and grace of action. She married Count Pepoli, of the Roman states, but kept her maiden name on the stage, appearing in opera at Munich as late as 1872. Her husband died in 1866, and in 1877 she married M. Zieger. She died in 1894.

ALBOBNOZ, *ÆGIDIUS ALVAREZ CARILLO*, a warlike prelate of the middle ages, was b. at Cuenca, 1310. He studied at Toulouse, and subsequently became almoner to Alfonso XI., king of Castile, who appointed him archdeacon of Calatrava, and finally archbishop of Toledo. He took part in the wars against the Moors, saved the life of the king in the battle at Tarifa, and was present at the siege of Algeciras, where the king dubbed him knight. On account of the Christian boldness with which he denounced the criminal excesses of Peter the cruel, he fell into disgrace, and had to flee to pope Clement VI., at Avignon, who made him a cardinal. Innocent VII. also recognized his political talents and sent him as cardinal-legate to Rome, where, by his tact and vigor, he secured, in spite of the intricate complication of affairs, the restoration of the papal authority in the states of the church (1353-62). Pope Urban V. owed the recovery of his dominions to him, and out of gratitude appointed him legate at Bologna in 1367. In the same year he died at Viterbo, but, expressing a wish to be buried at Toledo, almost royal honors were rendered to his dead body by the Spanish monarch, Henry of Castile; and Urban even granted an indulgence to all who had assisted in the transference of his remains from Viterbo to Toledo. He left a valuable work upon the constitution of the Romish church, printed for the first time at Jesi in 1473, and now very rare.

ALBOSTAN, a t. of Asiatic Turkey, in the pashalic of Marash, and 122 m. n. from Aleppo. Pop. estimated at 6500.

ALBOX, a t. of Andalusia, Spain, in the province of Almeria, 43 m. n.e. from Almeria, on a small affluent of the Almazora, which divides the t. into two parts. It has some good streets and buildings, and a fine square. Blankets, coarse linen and hempen fabrics, and earthenware are manufactured. There are also corn and oil mills. There is a great annual fair in Nov., lasting for a fortnight. Pop. 10,100.

ALBRECHT. See **ALBERT**.

ALBRECHTSBERGER, *JOHANN GEORG*, 1736-1809; an Austrian musician. He studied under Mann, the Vienna court organist, and became one of the most learned and skillful contrapuntists of his age. In 1772 he was appointed court organist, and in 1792 kapellmeister of St. Stephen's cathedral. Among his pupils were Beethoven, Hummel, Moscheles, Seyfried, and Weigl. His published works consist of preludes, fugues and sonatas for the piano and organ, and string quartettes; but the greater portion

of his labors are in manuscript, in possession of prince Esterhazy. His most valuable service to music was in his theoretical works, which substantially superseded earlier treatises.

ALBRET, JEANNE D', 1528-72, queen of Navarre, only daughter of Henry II. and Margaret, sister of Francis I. Jeanne married Antoine de Bourbon. She was celebrated for her intellectual strength and personal beauty. She embraced Calvinism, while her husband adhered to the Roman church, and asked the pope to annul his marriage; but Antoine died soon afterwards; and, in spite of Spanish menaces and Roman intrigue, Jeanne kept her possessions. In 1567 she declared the reformed religion established in the kingdom; and in 1569, with her children Henry and Catherine, she brought a small band of Huguenots to Coligny at La Rochelle, where, after the murder of the prince of Condé, she was looked upon as the only support of the Protestants. She wrote prose and verse, and some of her sonnets have been published.

ALBRIGHT, JACOB, a Lutheran minister, 1759-1808; b. Pennsylvania; founder of the EVANGELICAL ASSOCIATION (q.v.).

ALBUCA'SIS, or ABOO-L-KASIM, d. 1110; the most celebrated of Arabian writers on surgery; supposed to have practiced in Cordova. His chief work on anatomy, physiology, and the practice of medicine and surgery, is of great value, the treatise on surgery being the best that has come to us from antiquity, and important for tracing the progress of the art.

ALBUER'A, in the Spanish province of Estremadura, an insignificant hamlet, famous for the battle of May 16, 1811, between the combined English, Spanish, and Portuguese forces under Gen. Beresford, and the French under Marshal Soult, who were scarcely so numerous, but had abundant artillery. The object of the latter was to compel the English to raise the siege of Badajoz. The result was that Soult was obliged to retreat to Seville with the loss of 9000 men; the loss of the allied forces was about 7000. In proportion to the numbers engaged, the battle was the most sanguinary in the whole contest. The French had at first got possession of a height which commanded the whole position of the allied army, but they were driven from it by 6000 British, only 1500 of whom reached the top un wounded.

ALBUFER'A (an Arabic word meaning "the lake"), a lake near Valencia, in Spain, about 10 m. in length and the same in breadth, divided from the sea by a narrow tongue of land; a canal connects it with the city of Valencia. It is rich in fish and fowl, and is said to have been excavated by the Moors. From it marshal Suchet (q.v.) took the title of duke.

ALBU'GO is a term employed in surgery to designate the white opacity that often follows ulceration of the cornea of the eye. In infancy, the comparatively rapid interchange of materials will often diminish to a great extent both the extent and density of these spots, but in after-life they do not undergo similar absorption, nor are they amenable to surgical relief.

ALBUM, amongst the Romans, was a white tablet overlaid with gypsum, on which were written the *Annales Maximí* of the pontifex, edicts of the prætor, and rules relative to civil matters. It was so called, either because it was composed of a white material, or because the letters used were of that color. To tamper with the names written on an A. was regarded by the Romans as a serious offense, and involved a severe penalty. In the middle ages the word was used to denote any list, catalogue, or register, whether of saints, soldiers, or civil functionaries. In the gymnasia and universities on the continent the list of the names of the members is called the A. The name is also applied to the "black board" on which public notifications of lectures, etc., are written up. But its popular signification in modern times is that of a book for containing photographs, or a blank book for a drawing-room table, and intended to receive the fugitive pieces of verse, or the signatures of distinguished persons, or sometimes merely drawings, prints, marine plants, etc.

ALBU MEN, in physiological chemistry a definite proteid substance (now frequently spelt *Albumén*). It forms the chief ingredient in the white of egg, and abounds in the blood and chyle, and more or less in all the serous fluids of the animal body: it also exists in the sap of vegetables, and in their seeds and other edible parts. A. forms the starting point of animal tissues, for in an egg during incubation all the parts of the chick are formed out of it. The organized substances, fibrine and caseine, have a chemical composition similar to A.; and hence, along with A., they are called albuminous compounds. A. may be considered a raw material of fibrine, and fibrine as animalized A.

The chief component elements of A. are carbon, hydrogen, nitrogen, and oxygen, with small proportions of phosphorus and sulphur. It is believed to be a definite chemical compound, though the exact proportions and the rational formula have not been definitely ascertained. Carbon forms about 54 per cent of it; nitrogen, 16; and sulphur, 2. It is the sulphur of the A. that blackens silver when brought in contact with eggs, and the smell of rotten eggs arises from the formation of sulphureted hydrogen during the decomposition.

A. is soluble in water, and in such a state is found in the egg, the juice of flesh, the serum of blood, and the juice of vegetables; when heated from 140° to 160° F. (48 to 71° C.)

it coagulates, and is no longer soluble in water. With bichloride of mercury (corrosive sublimate), sulphate of copper (blue vitriol), acetate of lead (sugar of lead), nitrate of silver (lunar caustic), it forms insoluble compounds, and is therefore used as an antidote to these poisons. The property of coagulating with heat adapts A. for the purpose of clarifying in sugar-refining and other processes. The A. is added to the liquid in the cold state, allowed to mix thoroughly therein, and then, when heated, it coagulates, entangling and separating all the impurities suspended in the liquid. A. is likewise coagulated by the majority of the mineral acids, but not by acetic acid. Alcohol, ether, creosote, and tannic acid likewise cause the coagulation of A., and hence the efficacy of these substances, especially the two latter, in coagulating and thereby killing the nerves which cause so much pain in toothache. The importance of A. as an article of diet will be discussed under Food.

ALBUMEN, in botany, a store of nutritive matter, distinct from the embryo, but inclosed along with it within the integuments of the seed. It is also known by the names *perisperm* and *endosperm*. When a seed has a store of A. separate from the embryo, it is said to be *albuminous* or *perispermic*. When the nutritive matter is stored up in the cotyledons or lobes of the seed itself, as in the bean, pea, wall-flower, etc., the seed is said to be *exalbuminous* or *aperispermic*. In these the A., as a distinct part of the seed, is wanting, and the entire seed consists of embryo and integument. When the A. is present, it is sometimes very small, as in the nettle; in other instances, on the contrary, it is very much larger than the embryo, as in the cocoa-nut, of which it forms the edible part. It is also the edible or useful part of many other seeds—as in the different kinds of corn—and in coffee, nutmeg, etc. It is sometimes *mealy* or *farinaceous*, as in the cereals; *oily*, as in the poppy; *horny*, as in coffee; *cartilaginous*, as in the cocoa-nut; *mucilaginous*, as in the mallow. Vegetable ivory is the A. of a palm (genus *phytelephas*) which grows on the banks of the Magdalena, and is used in place of ivory. The presence or absence, and various peculiarities of A., afford botanical characters of great value. The A. appears to be a store provided for the nourishment of the embryo, and consists of starchy, oily, and albuminous matter. *Vegetable A.*, in a chemical sense, exists, and often in large quantity, even in seeds, which, according to the language of descriptive botany, are exalbuminous or destitute of A.; and to prevent confusion, *perisperm* has begun to be employed as the botanical term; but it is not yet in general use.

ALBUMENOIDS, or **PROTEIDS**, organic bodies in animals or plants; chief constituents of blood, nerve, muscle, glands, and other organs in animals; in smaller proportion but important in vegetable life. They consist of carbon, 52.7 to 54.5; hydrogen, 6.9 to 7.3; nitrogen, 15.4 to 16.5; oxygen, 20.9 to 23.5; sulphur, 0.8 to 1.6. They are soluble in alkalis, mineral acids, acetic acid, and in a degree in water; insoluble in ether, and nearly so in alcohol. Strong alkalis change them to leucine, tyrosine, oxalic acid, carbonic acid, ammonia, etc., according to temperature. In solutions they are precipitated by excess of mineral acids, by potassic ferrocyanide, with acetic or hydrochloric acid, by acetic acid in presence of a considerable quantity of alkaline or alkaline-earthly salt, gum arabic or dextrine, by mercuric nitrate, or Millon's reagent.

ALBUMINURIA, or **BRIGHT'S DISEASE**, albumen in the urine, with dropsical tendency, and organic change in the substance of the kidneys. Acute A. may commence with a chill followed by fever, dry skin, furred tongue, and rapid pulse; sometimes the countenance, or even the whole body, is swollen; urine greatly diminished, and dark red, as if bloody; dull pain about the loins, pallid skin, and thirst; loss of appetite, nausea, and vomiting. Rarely is there a complete suppression of urine, which is almost certainly fatal. Tested by heat and nitric acid, the urine shows so much albumen as to change almost into a mass of jelly. Under the microscope the sediment of the urine shows blood corpuscles, renal epithelium, and small fibrinous casts of the uriniferous tubes, containing entangled in them epithelial cells and blood globules. The causes of acute A. are exposure to cold, especially when the body is exhausted by fatigue, recent illness, or unsuitable diet; but excessive indulgence in alcoholic liquors is the most fruitful cause. Other diseases, in which the blood is in an altered condition, are sometimes preceded or followed by A., as acute rheumatism, typhus fever, erysipelas, and purpura; it may also follow scarlet fever, when it generally terminates favorably. No patient can be considered safe from A. so long as any trace of albumen can be found in the urine. The treatment is easy; let the patient put on flannel, and stay in bed, if possible, in an evenly heated room, carefully guarding against exposure or cold currents of air; diet to be simple and digestible, and not over-plentiful; on or near recovery, preparations of iron are useful to improve the blood and impart strength.

Chronic A. is sometimes thoroughly seated before suspected, and persons have died as was supposed from apoplexy, when the real cause was long-established albuminuria. But usually the symptoms are clear: loss of flesh, strength, and appetite, or, if appetite hold, flatulence and dyspeptic symptoms; the body becomes pallid, sallow, and looks waxy; the skin dry; swellings under the eyes, particularly in the morning, and the ankles œdematous at night; pain in the back, but generally not severe; there is irritability of the bladder, and a frequent desire to urinate; urine sometimes copious, but often less than average, pale and of low specific gravity, from 1.004 to 1.012. On test the quantity of albumen in the urine varies; sometimes it is large, often only a trace,

or hardly that. As the disease goes on, dropsy of the abdomen is apt to occur, and be the chief cause of suffering; anasarca is present, and all the cellular tissue is infiltrated with serum. There is a tendency to sleep which may lapse into coma, or alternate with epileptic convulsions. Bronchitis is apt to occur in severe form, or pneumonia to come insidiously and run rapidly to a fatal issue; rheumatism is not infrequent. The variety of diseases which collect in a case of chronic A. is of course in consequence of the condition of the blood—the alterations in the blood being the diminished amount of globules, the hematine sometimes reaching only a third of its proper quantity, and the presence of urea. The duration of the disease varies; those exposed to the weather and who lack the comforts of life, often die suddenly, while in persons in condition to avoid exposure and fatigue it may last for years, leaving the victims a good degree of the enjoyments of life; but their situation is always precarious, and serious or fatal disease may at any moment come on from trifling causes. The main cause of chronic A. is intemperance in eating or drinking, but especially in the use of distilled and fermented liquors. Exposure to cold, wet, fatigue, want, and mental anxiety are occasionally causes, and there are cases where no cause can be traced. Where neither dropsy, nor other difficult complications demand attention, the treatment should be more in careful clothing, diet, and exercise than in medicines. Flannel next the skin is indispensable, and exposure to wet and cold must be guarded against; unusual exercise, physical or mental, is forbidden; diet should be moderate and nutritious, and above all taken with regularity; fermented liquors should be avoided, although if long habit render them necessary the patient should select that which best agrees with him. See BRIGHT'S DISEASE.

ALBUÑOL, a t. of Spain, in the province of Granada, 41 m. s.e. from Granada, and about 3 m. from the coast of the Mediterranean. It is a well-built t., with clean paved streets. The surrounding district abounds in vineyards, and is also very productive of figs and almonds. The making of wine and brandy and the drying of raisins are the chief occupations of the inhabitants of the t. itself. Pop. 8764. The port of A. is a small place called La Rabitá.

ALBUQUERQUE, a t. of Estremadura, Spain, in the province of Badajoz, and 24 m. n. from Badajoz. It is a decaying place. Cotton and woolen fabrics are manufactured, also earthenware, soap, and chocolate. Pop. 9400.

ALBUQUERQUE, cap. of Bernalillo co., New Mexico, on the right bank of the Rio Grande, 56 m. s. w. of Santa Fé, and on the Atchison, Topeka and Santa Fé and Atlantic and Pacific r. r. It has an elevation of 5200 ft. above the sea; is the seat of the University of New Mexico (opened 1892), a government school for Indians and several academies; has a large trade in hides and wool and manufactures of iron, and in the vicinity are silver, gold, copper, and iron mines. Pop. 1880, 2315; 1890 (inc. old town), 5518.

ALBUQUERQUE, ALFONSO THE GREAT, viceroy of the Indies, and also called the Portuguese Mars, was b. in 1453, near Alhandra, a t. not far from Lisbon, of a family of the royal blood of Portugal. In that age the Portuguese people were distinguished for heroism and a spirit of adventure. They had discovered and subjugated a great part of the western coast of Africa, and were beginning to extend their dominion over the seas and people of India. A. being appointed viceroy of these new possessions, landed on the coast of Malabar, on Sept. 26, 1503, with a fleet and some troops; conquered Goa, which he made the seat of the Portuguese government, and the center of its Asiatic commerce; and afterwards the whole of Malabar, Ceylon, the Sunda isles, the peninsula of Malacca, and (in 1515) the island of Ormuz at the entrance of the Persian gulf. When the king of Persia sent for the tribute which the princes of this island had formerly rendered to him, A. presented bullets and swords to the ambassador, saying: "This is the coin with which Portugal pays her tribute." He made the Portuguese name profoundly respected among the princes and people of the east; and many of them, especially the kings of Siam and Pegu, sought his alliance and protection. All his undertakings bore the stamp of an extraordinary mind. He maintained strict military discipline, was active, far-seeing, wise, humane and equitable, respected and feared by his neighbors, while beloved by his subjects. Notwithstanding his valuable services, Albuquerque did not escape the envy of the courtiers and the suspicions of king Emmanuel, who appointed Lopez Soarez, a personal enemy of A., to supersede him as viceroy. This ingratitude affected him deeply. Ishmael, the shah of Persia, offered his assistance to resist the arbitrary decree of the Portuguese court; but A. would not violate his allegiance. A few days after, commending his son to the king in a short letter, he died at sea near Goa, Dec. 16, 1515. Emmanuel honored his memory by a long repentance, and raised his son to the highest dignities in the state. His life is well portrayed in the *Commentarios do Grande Alfonso de A.* (Lisbon, 1576 and 1774), published by his son Blasius.

ALBURG, a t in Grand Isle co., Vermont, on the Central Vermont railroad; pop. '90, 1390. It has a mineral spring, the waters of which are said to be useful in gout and rheumatism.

ALBURNUM, or SAPWOOD, in botany, is that part of the wood of exogenous trees which is still imperfectly hardened, and, consisting of the woody layers most recently formed, is interposed between the *bark* (q. v.) and the *heart-wood* or *duramen* (q. v.). There is often a very marked division between it and the duramen in trees whose age is such that the latter has been perfected. The A. differs from the duramen in having its tubes

still open for the passage of fluids; and these tubes appear to be the vessels which chiefly serve for the ascent of the sap (see SAP.). It gradually hardens, and is transformed into duramen, new layers being added externally. It is almost always of a white or very pale color, whilst in many trees the duramen is highly colored. The A. is pale even in ebony, in which the duramen is black. In general, the A. is much inferior in value to the hardened or perfected wood, and the different proportions which they bear to each other in the thickness of the stem, go far to determine the relative values of some kinds of trees. These proportions, however, are different not only in trees of different kinds, but even in trees of the same kind at different ages, and according as circumstances have been favorable or otherwise to rapidity of growth. When there is a great proportion of A. the wood dries slowly, and with difficulty, owing to the quantity of sap it contains.

AL'CA and **ALCADÆ**. See **AUK**.

ALCÆ'US, of Mitylene, one of the greatest lyric poets of Greece, flourished about the end of the 7th or the beginning of the 6th c. B.C. His odes in the Æolic dialect are occupied with his grief for the dissensions of his country, his hatred of tyrants, his own misfortunes, and the sorrows of exile; while on other occasions he celebrates the praises of love and wine. He is said to have been an admirer of Sappho, who was a contemporary. A. himself took part in the civil war, first as the coadjutor of Pittacus, but afterwards against him, when he proved tyrannical. Being banished from Mitylene, he endeavored, at the head of the other exiles, to force his way back; but in this attempt he fell into the hands of Pittacus, who, however, granted him his life and freedom. He was the inventor of the form of verse which after him is called the Alcaic, and which Horace, the happiest of his imitators, transplanted into the Latin language. Of the ten books of A.'s odes, only fragments remain, which are collected in the *Cambridge Museum Criticum* and in Bergk's *Poetæ Lyrici Græci* (Leip. 1843).

ALCA'ICS, the name of certain kinds of verse, from Alcæus, their reputed originator. One kind is of five feet, viz., a spondee or iambic, an iambic, a long syllable and two dactyls; the second kind of two dactyls and two troches. The A. ode is composed of several strophes, each of four verses, the first two of which are always alcaics of the first kind: the third verse is an iambic dimeter-hypercatalectic, consisting of four feet and a long syllable; and the fourth verse is an alcaic of the second kind. Example:

Non possidentem multa vocaveris
Recte beatum; rectius occupat
Nomen beati, qui deorum
Muneribus sapienter uti.

ALCAI'DE, or **ALCAYDE**, a Moorish title, applied by Spanish and Portuguese writers to a military officer having charge of a fortress, prison, or town. It is to be distinguished from *Alcalde*, which indicates a civil officer.

ALCALA' DE GUADAI'RA (*the castle of the Guadaira*), the ancient Carthaginian *Hien-ippa* ("place of many springs"), a t. of Andalusia, Spain, in the province of Seville, and 7 m. e. by s. from Seville. It stands near the Guadaira, partly on a hill, so that some of the streets are very steep, and is overlooked by the ruins of an ancient Moorish castle, once one of the most important, as its ruins are still among the finest, in Spain. This t. is beautifully situated, and on account of the salubrity of its climate is much resorted to as a summer residence by the inhabitants of Seville. It is celebrated for producing the finest bread in Spain; there are numerous bakeries in the t., and Seville is chiefly supplied from it. The water-mills and mule-mills for making flour are more than 200 in number, and, with the bakeries, give employment to a great part of the population. Every process connected with the making of bread is conducted with the greatest care. Seville is also supplied with water from the hill above A., which is perforated by tunnels, some of them 6 m. in length, forming underground canals. Some of the tunnels are believed to be Roman works, but most of them are known to have been made by the Moors. The water flowing through the subterranean canals is as clear as crystal. The neighborhood of A. is fertile, producing corn, wine, oil, silk, honey, and fruits, also sheep and oxen. Pop. 9000.

ALCALA' DE HENARES (*El Calaat*, in Arabic, means "the castle"), a t. in Spain, in the province of New Castile, situated on the Henares, 22 m. from the capital, pop. 12,000. It is built in the old style, and boasts of a university, which was founded by cardinal Ximenes in 1510, and once enjoyed a world-wide fame, second to that of Salamanca alone. When Francis I. visited it, while a prisoner in Spain, he was welcomed by 11,000 students. The library contains the original of the celebrated polyglot Bible which was printed in this t., and called the Complutensian, from the ancient name of the place (Complutum). A. has, besides, a military academy, and a celebrated powder and leather factory. It is said to have been the birthplace of Cervantes, and various other distinguished persons.—There are several other towns in Spain which bear the name of **ALCALA**; as A. of Chisberte, in Valencia (pop. 6000); A. de Guadaira, near Seville (9000), and A. la Real, in Jaen (16,000), with superior wine, fruit, sheep, etc.

ALCALA' LA REAL' (*the Royal Castle*), a city of Andalusia, Spain, in the province of Jaen, and 26 m. n.w. from Granada. It is situated on a conical hill, in a narrow valley, on the n. side of the mountains which separate the province of Jaen from that of Gran-

ada, at an elevation of nearly 3000 ft above the sea. It is a very picturesque t., irregularly built, with steep and narrow streets and bold towers. It was the stronghold of the alcaide Ibn Zaide; and being taken in 1340, by Alonzo XI. in person, it obtained the name *Real*. It has a hospital, formerly an abbey, a very fine building. The neighborhood produces grain and fruits of the finest quality, and the inhabitants of the t. are mostly engaged in agriculture. There is some trade in wine and wool. Pop. 16,521.

ALCAL DE, a corruption of the Arabic *el-cadi*, "the judge," a word introduced by the Moors. It is still used in Spain as the general title of judicial and magisterial office, the special function being denoted by another term. Thus, there are *alcaldes de aldea*, village-justices; *alcaldes pedaneos*, justices of the peace; *alcaldes de corte*, judges of the court, etc.

ALCAM'ENES, lived 448 to 400 B.C., a famous Athenian sculptor, pupil of Phidias, commended for skill in his art by Cicero, Pliny, and others. With Phidias and Poly-cletus, he formed the great triumvirate of Greek sculptors. He is said to have competed with his master in creating statues of Minerva, but overlooked the height at which his was to be seen and made it too small, though otherwise perfect. The "Venus Urania" in the temple at Athens was his masterpiece.

AL CAMO, a t. of Sicily, in the province of Trapani, and 23 m. e. from Trapani, in the Val di Mazzara, on the high-road between Palermo and Trapani. It is said to have been founded by the Arabs, on their first invasion of Sicily in 827. The original t. stood on a hill, and long retained a Moslem population, who were driven out by the emperor Frederick II. in 1223, and the new t. was built at the foot of the hill. A. is surrounded by a battlemented wall of the 14th c. The houses are mostly mean, and the streets irregular and dirty; the whole place having an air of poverty and decay. It contains, however, some fine old churches and palaces. Pop. about 23,000.

ALCAÑIZ, a t. of Aragon, Spain, in the province of Teruel, 63 m. s.e. from Saragossa. It is situated on a rising ground on the right bank of the Guadalupe, which is here crossed by a bridge of nine arches. It is a well-built t., with wide paved streets, and a number of squares. It has a magnificent collegiate church, in which are many fine tombs and pictures. There are manufactures of silk, woollen, and coarse linen fabrics, hats, and soap; there are also flour and oil mills, and some trade in grain, cattle, and the manufactures of the t. Pop. 7800.

ALCANTARA (*Al-kantarah*, Arabic, "the bridge"), the Norba Cæsarea of the Romans, an old fortified Spanish t., built by the Moors in the province of Estremadura. The present population is about 4000. It was plundered by the French under general Lapisse in 1809. The bridge from which it takes its name was built for Trajan, 105 A.D. It consists of 6 arches, the 2 central ones with a span of 110 ft.; the whole length is 670, and the height 210 ft. This remarkable structure was partially blown up by the English in 1812, and was again destroyed during the civil war of 1836; and though it might be easily repaired, it is left in a state of ruin, the lazy Spaniards being ferried over in a lumbering boat.

THE ORDER OF A. (formerly St. Julian), one of the religious orders of Spanish knight-hood, was founded (1156) as a military fraternity for the defense of Estremadura against the Moors. In 1197, Pope Celestine III. raised it to the rank of a religious order of knighthood; bestowed great privileges on it, and charged it with the defense of the Christian faith, and the maintenance of eternal war with the infidel. Alphonso IX., having taken the t. of A., ceded it in 1218 to the order of Calatrava (q.v.); but the knights of this order, unable to hold it along with their other great possessions, yielded it to the knights of St. Julian, who transferred it to their seat, and henceforth were known by its name. At length the grand-mastership of the order was, by pope Alexander VI., united to the Spanish crown in 1495. The order is still richly endowed. The knights, who follow the rule of St. Benedict, take now only the vows of obedience and poverty, having, since 1540, been absolved from that of celibacy. A special vow binds them to defend the immaculate conception of the virgin. At their nomination, they must prove four generations of nobility. For a time, the knights of A. acknowledged the superiority of the knights of Calatrava, but they were latterly absolved from it. In 1835, the order ceased to exist as an ecclesiastical body and became an order of the court. The crest of the order is a pear-tree.

ALCANTARA, a seaport t. of Brazil, in the province of Maranhão, 17 m. n.w. from Maranhão, near the mouth of the bay of St. Marcos. Most of the houses are only of one story. The more wealthy residents are mostly cotton-planters; the poorer classes live chiefly by fishing, and by making hammocks of some of the peculiar fibers of the country. There are salt-pits not far from the t. Cotton, rice, and salt are exported. Pop. 5000.

ALCARAZ', a t. of La Mancha, Spain, in the province of Albacete, and 36 m. w.s.w. from Albacete. It stands on the slope of an isolated hill, on the left bank of the Guadarmena, a feeder of the Guadalquivir. A ruined castle crowns the summit of the hill; and there are also the remains of a fine Roman aqueduct. Some of the streets are very steep. The inhabitants are partly employed in weaving and iron-working, partly in agriculture. Pop. about 5000.

ALCATRAZ', or PELICAN ISLAND, in the bay of San Francisco, n.w. of the city, fortified by the federal government, and having a light-house on its highest ground. The island is less than a third of a mile in length. It commands the entrance to the bay.

ALCAUDET'E (anc. *Uditunum*), a t. of Andalusia, Spain, in the province of Jaen and 22 m. s.w. from Jaen. It is situated in a hollow, enclosed by three hills, on an affluent of the Guadalquivir, is overlooked by the ruins of an ancient castle, and is tolerably well built. There are fine pictures in some of the churches. Oil and rope making, weaving, and agriculture are the chief employments of the inhabitants. Grain, silk, oxen, sheep, goats, pigs, mules, and asses are produced in the neighborhood. Pop. 9200.

ALCAVA'LA, or ALCABA'LA, a duty formerly charged in Spain and her colonies on transfers of property, whether public or private. It was begun in 1341 by Alphonso XI. at 10 and increased to 14 per cent of the selling price of all commodities, raw or manufactured, and charged as often as they were sold or exchanged. This monstrous impost was enforced, nearly ruining the commerce of the kingdom, down to the invasion of Napoleon. Catalonia and Arragon purchased from Philip V. exemption from the tax, and, though still burdened heavily, were in a flourishing state in comparison with districts covered by the Alcovalla.

ALCE DO. See KINGFISHER.

ALCESTER (BARON), The Right Hon. FREDERICK BEAUCHAMP PAGET SEYMOUR, G.C.B., was born in London, Eng., 1821. Entering the Royal Navy, Jan., 1834, he received his lieutenant's commission in 1842, became a captain in 1854, rear-admiral in 1870, vice-admiral in 1876, and admiral in 1882. He served with honor in the Burmese war, 1852-3, and against the Russians in 1854. From Oct., 1874, till Nov., 1877, he commanded the Channel Squadron, and in 1880 he was appointed commander-in-chief in the Mediterranean. While in command of the Allied Fleet of the European Powers, he distinguished himself in the naval demonstration off the Albanian coast, and in the following year was created G.C.B. In the Egyptian war, as commander-in-chief of the Mediterranean fleet, he took a conspicuous part, reducing Alexandria and retaining the command until the arrival of Sir Garnet Wolseley. For his distinguished services he was elevated to the peerage by the title of Baron Alcester of Alcester. D. in 1895.

ALCHEMY is to modern chemistry what astrology is to astronomy, or legend to history. In the eye of the astrologer, a knowledge of the stars was valuable only as a means of foretelling, or even of influencing, future events. In like manner, the genuine alchemist toiled with his crucibles and alembics, calcining, subliming, distilling, not with a view to discover the chemical properties of substances, as we understand them, but with two grand objects, as illusory as those of the astrologer—to discover, namely, (1) *the secret of transmuting the baser metals into gold and silver*, and (2) *the means of indefinitely prolonging human life*.

Tradition points to Egypt as the birthplace of the science. Hermes (q.v.) Trismegistus is represented as the father of it; and the most probable etymology of the name is that which connects it with the most ancient and native name of Egypt, *Chemí* (the Scripture Cham or Ham). The Greeks and Romans under the empire would seem to have become acquainted with it from the Egyptians; there is no reason to believe that, in early times, either people had the name or the thing. *Chemia* (Gr. *chemeia*) occurs in the lexicon of Suidas, written in the 11th c., and is explained by him to be "the conversion of silver and gold." It is to the Arabs, from whom Europe got the name and the art, that we owe the prefixed article *al*. As if *chemia* had been a generic term embracing all common chemical operations, such as the decocting and compounding of ordinary drugs, the grand operation of transmutation was denominated the *chemia* (*al*-chemy)—the chemistry of chemistries. The Roman emperor Caligula is said to have instituted experiments for the producing of gold out of orpiment (sulphuret of arsenic); and in the time of Diocletian, the passion for this pursuit, conjoined with magical arts, had become so prevalent in the empire, that that emperor is said to have ordered all Egyptian works treating of the chemistry of gold and silver to be burnt. For at that time, multitudes of books on this art were appearing, written by Alexandrine monks and by hermits, but bearing famous names of antiquity, such as Democritus, Pythagoras, and Hermes.

At a later period, the Arabs took up the art; and it is to them that European A. is directly traceable. The school of polypharmacy, as it has been called, flourished in Arabia during the caliphates of the Abbasides. The earliest work of this school now known is the *Summa Perfectionis*, or "Summit of Perfection," composed by Gebir (q.v.) in the 8th c.; it is consequently the oldest book on chemistry proper in the world. It contains so much of what sounds very much like jargon in our ears, that Dr. Johnson ascribes the origin of the word "gibberish" to the name of the compiler. Yet when viewed in its true light, it is a wonderful performance. It is a kind of text-book, or collection of all that was then known and believed. It appears that these Arabian polypharmists had long been engaged in firing and boiling, dissolving and precipitating, subliming and coagulating chemical substances. They worked with gold and mercury, arsenic and sulphur, salts and acids; and had, in short, become familiar with a large range of what are now called chemicals. Gebir taught that there are three elemental chemicals—mercury, sulphur, and arsenic. These substances, especially the first two, seem to have fascinated the thoughts of the alchemists by their potent and penetrating qualities. They saw mercury dissolve gold, the most incorruptible of matters, as water

dissolves sugar; and a stick of sulphur presented to hot iron penetrates it like a spirit, and makes it run down in a shower of solid drops, a new and remarkable substance, possessed of properties belonging neither to iron nor to sulphur. The Arabians held that the metals are compound bodies, made up of mercury and sulphur in different proportions. With these very excusable errors in theory, they were genuine practical chemists. They toiled away at the art of making "many medicines" (polypharmacy) out of the various mixtures and reactions of such chemicals as they knew. They had their pestles and mortars, their crucibles and furnaces, their alembics and aludels, their vessels for infusion, for decoction, for cohabitation, sublimation, fixation, lixiviation, filtration, coagulation, etc. Their scientific creed was transmutation, and their methods were mostly blind gropings; and yet, in this way, they found out many a new body, and invented many a useful process.

From the Arabs A. found its way through Spain into Europe, and speedily became entangled with the fantastic subtleties of the scholastic philosophy. In the middle ages, it was chiefly the monks that occupied themselves with A. Pope John XXII. took great delight in it, though it was afterwards forbidden by his successor. The earliest authentic works on European A. now extant are those of Roger Bacon (b. 1214, d. 1284) and Albertus Magnus (Albert of Bollstädt, q.v.). Bacon (q.v.) appears rather the earlier of the two as a writer, and is really the greatest man in all the school. He was acquainted with gunpowder. Although he condemns magic, necromancy, charms, and all such things, he believes in the convertibility of the inferior metals into gold, but does not profess to have ever effected the conversion. He had more faith in the elixir of life than in gold-making. He followed Gebir in regarding portable gold—that is, gold dissolved in nitro-hydrochloric acid or *aqua regia*—as the elixir of life. Urging it on the attention of pope Nicholas IV., he informs his holiness of an old man who found some yellow liquor (the solution of gold is yellow) in a golden vial, when plowing one day in Sicily. Supposing it to be dew, he drank it off. He was thereupon transformed into a hale, robust, and highly accomplished youth. Bacon no doubt took many a dose of this golden water himself.—Albertus Magnus had a great mastery of the practical chemistry of his times; he was acquainted with alum, caustic alkali, and the purification of the royal metals by means of lead. In addition to the sulphur-and-mercury theory of the metals, drawn from Gebir, he regarded the element water as still nearer the soul of nature than either of these bodies. He appears, indeed, to have thought it the primary matter, or the radical source of all things—an opinion held by Thales, the father of Greek speculation.—Thomas Aquinas (q.v.) also wrote on A., and was the first to employ the word *amalgam* (q.v.).—Raymond Lully (q.v.) is another great name in the annals of A. His writings are much more disfigured by unintelligible jargon than those of Bacon and Albertus Magnus. He was the first to introduce the use of chemical symbols, his system consisting of a scheme of arbitrary hieroglyphics. He made much of the spirit of wine (the art of distilling spirits would seem to have been then recent), imposing on it the name of *aqua vite ardens*. In his enthusiasm, he pronounced it the very elixir of life. One of the most celebrated of the alchemists was Basil Valentine (q.v.), b. 1394, who introduced antimony into medical use. He, along with some previous alchemists, regarded salt, sulphur, and mercury as the three bodies contained in the metals. He inferred that the philosopher's stone must be the same sort of combination—a compound, namely, of salt, sulphur, and mercury; so pure, that its projection on the baser metals should be able to work them up into greater and greater purity, bringing them at last to the state of silver and gold. His practical knowledge was great; he knew how to precipitate iron from solution by potash, and many similar processes, so that he is ranked as the founder of analytical chemistry.

But more famous than all was Paracelsus (q.v.), in whom A. proper may be said to have culminated. He held, with Basil Valentine, that the elements of compound bodies were salt, sulphur, and mercury—representing respectively earth, air, and water, fire being already regarded as an imponderable—but these substances were in his system purely representative. All kinds of matter were reducible under one or other of these typical forms; everything was either a salt, a sulphur, or a mercury, or, like the metals, it was a "mixture" or compound. There was one element, however, common to the four; a fifth essence or "quintessence" of creation; an unknown and only true element, of which the four generic principles were nothing but derivative forms or embodiments: in other words, he inculcated the dogma that there is only one real elementary matter—nobody knows what. This one prime element of things he appears to have considered to be the universal solvent of which the alchemists were in quest, and to express which he introduced the term *alcahest*—a word of unknown etymology, but supposed by some to be composed of the two German words *alle geist*, "all spirit." He seems to have had the notion that if this quintessence or fifth element could be got at, it would prove to be at once the philosopher's stone, the universal medicine, and the irresistible solvent.

After Paracelsus, the alchemists of Europe became divided into two classes. The one class was composed of men of diligence and sense, who devoted themselves to the discovery of new compounds and reactions—practical workers and observers of facts, and the legitimate ancestors of the positive chemists of the era of Lavoisier. The other class took up the visionary, fantastical side of the older A., and carried it to a degree of extravagance before unknown. Instead of useful work, they compiled mystical

trash into books, and fathered them on Hermes, Aristotle, Albertus Magnus, Paracelsus, and other really great men. Their language is a farrago of mystical metaphors, full of "red bridegrooms" and "lily brides," "green dragons," "ruby lions," "royal baths," "waters of life." The seven metals correspond with the seven planets, the seven cosmical angels, and the seven openings of the head—the eyes, the ears, the nostrils, and the mouth. Silver was Diana, gold was Apollo, iron was Mars, tin was Jupiter, lead was Saturn, and so forth. They talk forever of the power of attraction, which drew all men and women after the possessor; of the alcahest, and the grand elixir, which was to confer immortal youth upon the student who should approve himself pure and brave enough to kiss and quaff the golden draught. There was the great mystery, the mother of the elements, the grandmother of the stars. There was the *philosopher's stone*, and there was the *philosophical stone*. The philosophical stone was younger than the elements, yet at her virgin touch the grossest calx (ore) among them all would blush before her into perfect gold. The philosopher's stone, on the other hand, was the first-born of nature, and older than the king of metals. Those who had attained full insight into the arcana of the science were styled wise; those who were only striving after the light were philosophers; while the ordinary practitioners of the art were called adepts. It was these visionaries that formed themselves into Rosicrucian societies and other secret associations. It was also in connection with this mock A., mixed up with astrology and magic, that quackery and imposture so abounded, as is depicted by Scott in the character of Dousterswivel in the *Antiquary*. Designing knaves would, for instance, make up large nails, half of iron and half of gold, and lacker them, so that they appeared common nails, and when their credulous and avaricious dupes saw them extract from what seemed plain iron an ingot of gold, they were ready to advance any sum that the knaves pretended to be necessary for pursuing the process on a large scale. It is from this degenerate and effete school that the prevailing notion of A. is derived—a notion which is unjust to the really meritorious alchemists who paved the way for genuine chemistry.

It is interesting to observe that the leading tenet in the alchemists' creed—namely, the doctrine of the transmutability of other metals into gold and silver—a doctrine which it was at one time thought that modern chemistry had utterly exploded—receives not a little countenance from a variety of facts every day coming to light. The multitude of phenomena known to chemists under the name of *allotropy* (q. v.), are leading speculative men more and more to the opinion that many substances hitherto considered chemically distinct, are only the same substance under some different condition or arrangement of its component molecules, and that the number of really distinct elements may be very few indeed. The two alchemists, Basil Valentine and Paracelsus, recognizing the importance of the strange substances which escaped from the retorts of the masters of A. in the transmutation of bodies, gave them the name of mercury; the elders called them souls or spirits; Van Helmont studied them more closely, and gave them the name of gas. He was acquainted with carbonic acid under the name of woody gas; but his ignorance of the action of the oxygen of the atmosphere prevented him from making the fundamental distinction between experiments performed in a closed vessel and in one open to the air. Priestley, Lavoisier, and Scheele, by the use of the test tube and the balance, weighed and tested the results of ancient A., and thence modern chemistry was born; but the work had already been begun by men of genius, such as Bernard Palissy, Boyle, Homberg, the Geoffreys, Margraff, Bergman, and Rouelle, the master of Lavoisier, who may be called the Diderot of chemistry. It is also true that the most important discoveries in chemistry have been made by men who combined with chemical experiments a marked taste for alchemic theories; for instance, Glauber, ablest of mystics; Kunkel, who thought he had found in the "shining pills" of his *phosphorus mirabilis* as efficacious a remedy as the potable gold in which he also believed; Glaser, the alchemist, master of Lemery, who has been called the father of chemistry; Robert Fludd, and others. Soon after chemistry was settled as a science there was a crusade in search of the philosopher's stone. Among French seekers was De Lisle, who died in the Bastille of wounds inflicted by his keepers in trying to extort his secret; among Englishmen, Dr. Price, who committed suicide to avoid a public trial of his pretended discoveries. Doubtless the main idea of A. is yet alive. One of the greatest of French chemists, Dumas, thought as to the theoretical possibility of making gold, that a solution might be found in the doctrine of isomerism; and the more famous English savant, Sir Humphrey Davy, refused to decide that the alchemists must be wrong. In 1796 two German physicians founded a society for the investigation of the transmutation of metals, and this society and its branches existed as late as 1820. A text-book of chemistry by Baudrimont (1844) says "a certain Mr. Javary has obtained very surprising results by following the prescriptions of the ancient alchemists, so that there is hope of at last seeing the great work succeed." Another work by Fiffereau (1856) affirms that the metals are compound bodies, and that silver can be changed into gold. The literature of A. is enormous, including such names as Roger Bacon, Lord Bacon, Becher, Fludd, Hermis Trismegisti, Glauber, Kunkel, Paracelsus, Quercetean, Basil Valentine, Peter Gregory, etc., not to mention Greek, Roman, and Arabic writers. See Kopp's *Geschichte der Chemie*; *Alchemy and the Alchemists*, by Dr. Samuel Brown, in Chambers's *Papers for the People* (No. 66).

ALCIA'TI, **ANDRE'A**, 1492–1550; an Italian jurist, skillful in his exposition of the laws, for which he is praised by De Thou. He published many legal works, annotations on Tacitus, and *Emblems* or moral sayings in Latin verse, greatly admired. His *History of Milan* was published in 1625.

ALCIBIADES, a son of Clinias and Dinomache, b. at Athens, 450 B.C. He lost his father in the battle of Chæronea, and was in consequence educated in the house of Pericles, his uncle. In his youth he gave evidence of his future greatness, excelling both in mental and bodily exercises. His handsome person, his distinguished parentage, and the high position of Pericles, procured him a multitude of friends and admirers. Socrates was one of the former, and gained considerable influence over him; but was unable to restrain his love of luxury and dissipation, which found ample means of gratification in the wealth that accrued to him by his union with Hipparete, the daughter of Hipponicus. His public displays, especially at the Olympic games, were incredibly expensive. He bore arms for the first time in the expedition against Potidæa (432 B.C.), where he was wounded, and where his life was saved by Socrates—a debt which he liquidated eight years after at the battle of Delium, by saving, in his turn, the life of the philosopher; but he seems to have taken no part in political matters till after the death of the demagogue Cleon, when Nicias brought about a treaty of peace for fifty years between the Athenians and Lacedæmonians. A., jealous of the esteem in which Nicias was held, persuaded the Athenians to ally themselves with the people of Argos, Elis, and Mantinea, and did all in his power to stir up afresh their old antipathy to Sparta. It was at his suggestion that they engaged in the celebrated enterprise against Sicily, to the command of which he was elected, along with Nicias and Lamachus. But while preparations were being made, it happened during one night that all the statues of Mercury in Athens were mutilated. The enemies of A. threw the blame of this mischief upon him, but postponed the impeachment till he had set sail, when they stirred up the people against him to such a degree that he was recalled, in order to stand his trial. On his way home, he landed at Thurii, fled, and betook himself to Sparta, where, by conforming to the strict manners of the people, he soon became a favorite. He induced the Lacedæmonians to send assistance to the Syracusans, persuaded them to form an alliance with the king of Persia, and after the unfortunate issue of the Athenian expedition in Sicily, to support the people of Chios in their endeavors to throw off the yoke of Athens. He went thither himself, and raised all Ionia in revolt against that city. But Agis and the other leading men in Sparta, jealous of the success of A., ordered their generals in Asia to have him assassinated. A. discovered this plan, and fled to Tissaphernes, a Persian satrap, who had orders to act in concert with the Lacedæmonians. He now resumed his old manners, adopted the luxurious habits of Asia, and made himself indispensable to Tissaphernes. He represented to the latter that it was contrary to the interests of Persia entire to disable the Athenians. He then sent word to the commanders of the Athenian forces at Samos that he would procure for them the friendship of the satrap if they would control the extravagance of the people, and commit the government to an oligarchy. This offer was accepted, and Pisander was sent to Athens, where he got the supreme power vested in a council of 400 persons. When it appeared, however, that this council had no intention of recalling A., the army at Samos chose him as their commander, desiring him to lead them on instantly to Athens, and overthrow the tyrants. But A. did not wish to return to his native country till he had rendered it some service, and he accordingly attacked and defeated the Lacedæmonians both by sea and land. Tissaphernes now ordered him to be arrested at Sardis on his return, the satrap not wishing the king to imagine that he had been accessory to his doings. But A. found means to escape; placed himself again at the head of the army; beat the Lacedæmonians and Persians at Cyzicus; took Cyzicus, Chalcedon, and Byzantium; restored to the Athenians the dominion of the sea; and then returned to his country (407 B.C.), to which he had been formally invited. He was received with general enthusiasm, as the Athenians attributed to his banishment all the misfortunes that had befallen them.

The triumph of A., however, was not destined to last. He was again sent to Asia with 100 ships; but not being supplied with money for the soldiers' pay, he was obliged to seek assistance at Caria, where he transferred the command in the meantime to Antiochus, who being lured into an ambuscade by Lysander, lost his life and part of the ships. The enemies of A. took advantage of this to accuse him and appoint another commander. A. went to Thrace, where he lived in voluntary exile in Pactyæ, one of the castles which he had built out of his earlier spoils. But being threatened here with the power of Lacedæmonia, he removed to Bithynia, with the intention of repairing to Artaxerxes, to gain him over to the interests of his country. At the request of the thirty tyrants of Athens, and with the concurrence of the Spartans, Pharnabazus, a satrap of Artaxerxes, received orders to put A. to death. He was living at this time in a castle at Phrygia; Pharnabazus ordered it to be set on fire during the night, and as his victim was endeavoring to escape from the flames, he was pierced with a volley of arrows. Thus perished A. (404 B.C.), about the 45th year of his age. He was singularly endowed by nature, being possessed of the most fascinating eloquence (although he could not articulate the letter *r*, and stuttered in his speech), and having in a rare degree the talent to win and to govern men. Yet in all his transactions, he allowed himself to be directed by external circumstances, without having any fixed principles of conduct.

On the other hand, he possessed that boldness which arises from conscious superiority, and shrunk from no difficulty, because he was never doubtful concerning the means by which an end might be attained. His life has been written by Plutarch and Cornelius Nepos.

ALCIN'OUS, a mythical king of the Phæcians, grandson of Neptune. He was immortalized in the *Odyssey* for the relief and entertainment extended to Ulysses by his daughter Nausicaa. The subjects of A. loved pleasure, but they were skillful seamen, and he is described as having been a good prince.

AL'CIPH'RON, a Greek epistolary writer, probably contemporary with Lucian. His letters, 116 of which have been published, are in pure Attic dialect, and are considered models of style. The imaginary authors are common people, fishermen, court-sals, and parasites. The letters are valuable as picturing Athenian private life at that period.

ALCIRA (anc. *Sebaticula*), a t. of Spain, in the province of Valencia, 20 m. s. by w. from Valencia, on an island in the river Xucar, the two branches of which are here crossed by stone bridges. It is surrounded by old walls, with strong towers. The principal streets are wide, but the t. is ill built. The inhabitants are chiefly employed in the manufacture of earthenware, the production of silk, and agriculture. The surrounding country is much intersected by canals, exhibiting an admirable specimen of the system of irrigation introduced by the Moors. Pop. 18,500.

ALCMÆ'ON, in Greek legend, son of Amphiarus and Eriphyle, and brother of Amphiloclus. He was a leader of the Epigoni who went against Thebes to revenge the death of their fathers in the war of the seven. After the fall of Thebes, A. killed his mother, as he had been ordered by his father. For this act madness came upon him, and he was always pursued by the furies. He married Arsinoë, daughter of Phlegon, king of Psophis, and also Calirrhoe, daughter of the river-god Achelous. The last wife coveted the necklace and peplus of Harmonia, once belonging to his mother, which he had given to Arsinoë, and he got them from Arsinoë by the false pretense of wishing to dedicate them at Delphi in hope to cure his madness. When his father-in-law heard that he had got the treasures for his new wife, he sent his sons, who killed A.; but A.'s sons by Calirrhoe took bloody vengeance, at her instigation. After his death A. seems to have been worshiped, and had altars at Thebes and elsewhere; his tomb was shown at Psophis, and he had a statue at Delphi.

ALCMÆ'ON, a Greek natural philosopher of the latter part of the 6th c. B.C., b. in Crotona, s. Italy, and said to have been a pupil of Pythagoras. He was the first who practiced dissection of animals; but it is a question whether he ever operated on a human body. He thought the human soul was immortal, because, like the heavenly bodies, it contained within itself a principle of motion. The eclipses of the moon he thought were occasioned by her shape, like that of a boat.

ALC'MAN, an ancient lyric poet, was born at Sardis, the capital of Lydia, in Asia Minor, but lived first as a slave, and afterwards as a freeman in Sparta. He is the earliest erotic poet, and is said to have introduced some new metrical forms called *Alcmanica metra*. He composed in the Doric dialect a poem on the Dioscuri, Parthenia, or songs sung by choruses of virgins, bridal-hymns, verses in praise of love and wine, etc. We possess only a few fragments of A., nor do these justify the high opinion entertained of his merits by the ancients, though some of them exhibit considerable beauty. A. d. of a loathsome disease (*morbus pedicularis*).

ALCME'NE, in Greek mythology, daughter of Electryon king of Mycenæ, and wife of Amphitryon; mother of Hercules, by Jupiter, who came to her in the form of her husband. She was the mother of Iphicles by Amphitryon.

ALCO, a variety of dog, domesticated in Mexico and Peru before the discovery of America by Europeans, and also found in a wild state in these countries. But whether it is originally a native of them, or has escaped from domestication, is uncertain, nor is the variety well known to naturalists. It is described as having a very small head and pendulous ears: the latter being in dogs one of the ordinary results of domestication. Humboldt supposed it to be allied to the shepherd's dog. It has been attempted to elevate it into a species under the name of *canis A.* It is not improbable that the name A. was given to more varieties than one.

ALCOCK, Sir RUTHERFORD, b. London, 1809; British diplomatist and author. He held posts in the naval, medical, and diplomatic services in Spain and Portugal, 1833-44; was British consul at Foo-chow, Shanghai and Canton in China; consul-general to Japan, 1858; and later, minister plenipotentiary. Owing to the ignorance then existing concerning the true relations of the tycoon and the mikado—that of vassal, instead of equal—his course was beset with many difficulties, and attempts were made upon his life in 1860 and 1862. He was one of the four foreign ministers who ordered the bombardment of Shimonoseki, and then exacted an indemnity of \$3,000,000. For this he was recalled. A. was made K.C.B. in 1863, and was minister plenipotentiary to China 1865-71. He is a vice-president of the royal geographical society; has published *Medical History of*

the British Legion in Spain, Life's Problems, The Capital of the Tycoon, or Three Years in Japan, and Art and Art Industries in Japan.

ALCOHOL is a limpid, colorless liquid, of a hot, pungent taste, and having a slight but agreeable smell. It is the characteristic ingredient of fermented drinks, and gives them their intoxicating quality. Looking at the extraordinary consumption of these liquors, and to the extensive application of A. for other purposes, it becomes one of the most important substances produced by art.

There is only one source of A.—namely, the fermentation of sugar or other saccharine matter. Sugar is the produce of the vegetable world. Some plants contain free sugar, and still more contain starch, which can be converted into sugar. The best vegetable substances, then, for yielding A. are those that contain the greatest abundance of sugar or of starch. See **DIASTASE**, **FERMENTATION**, and **DISTILLATION**.

Owing to the attraction of A. for water, it is impossible to procure pure A. by distillation alone. Common spirits, such as brandy, whisky, etc., contain 50 or 52 per cent of A.; in other words, they are about half A., half water. *Proof-spirit*, which is the standard by means of which all mixtures of A. and water are judged, contains 57·27 per cent by volume, and 49·50 per cent by weight, of A. The specific gravity of proof-spirit is ·9186; and when a spirit is called *above proof*, it denotes that it contains an excess of A.; thus, *spirit of wine*, or rectified spirit, with specific gravity ·838, is 54 to 58 over-proof, and requires 54 to 58 per cent of water to be added to it, to bring the strength down to that of proof-spirit; whilst the term *under proof* has reference to a less strong spirit than the standard. See **AREOMETER**. The most primitive method of learning the strength of A. was to drench gunpowder with it, set fire to the spirit, and if it inflamed the gunpowder as it died out, then the A. stood the test or proof, and was called proof-spirit. The highest concentration possible by distillation gives 90 per cent of A., still leaving 10 per cent of water. In order to remove this, fused chloride of calcium, quicklime, or fused carbonate of potash, is added to the alcoholic liquid, the whole allowed to stand for twelve hours, and then the spirit may be distilled off quite free from water. Spirit of wine may also be deprived of its remaining water by suspending it in a bladder in a warm place; the bladder allows much of the water to pass through and evaporate, but little of the A. The latter method is called Soemmering's process, and depends on the different degrees of rapidity with which the bladder admits of water and A. passing through it. Thus, introduce into one bladder 8 oz. of water, and into a second, 8 oz. of A., and allow both bladders to be similarly exposed on a sand-bath, till all the water has evaporated through the pore of the membrane, which will be accomplished in about 4 days, and it will then be observed that whilst 8 oz. water have made their exit from the bladder, that only one ounce of A. has thus evaporated, and 7 oz. still remain in the bladder. This experiment explains why smugglers, a few generations ago, could supply a whisky which was stronger, and hence esteemed preferable, as they carried the whisky in bladders around their persons, and the water escaping therefrom in much greater proportion than the A., a stronger spirit was left.

A. is used medicinally, both internally and externally. The more common form for internal use is brandy, and is that generally recommended by physicians. As a *stomachic stimulant*, A. is used in sea-sickness and indigestion. As a *stimulant and restorative*, it is employed with advantage in the later stages of fever. It is also employed internally as a *powerful excitant* to prevent fainting during operations, and to assist in restoration in cases of suspended animation. In cases of diarrhea, unaccompanied by inflammation, it is often of great benefit. Externally, A. is applied to stop hemorrhage, to harden the cuticle over tender parts, as the nipples of females for some time before delivery, and to feet which have been blistered from long walking or tight-fitting shoes.

Absolute or anhydrous A. has a specific gravity of 793 at the temperature of 60°. It boils at 173°, and has not been frozen by any cold hitherto produced. Reduced to a temperature of —130°, A. becomes of an oily and greasy consistence; at —146° it assumes the aspect of melted wax; and at —166° it gets still thicker, but does not congeal at the lowest attainable temperature. This property of non-freezing at any degree of cold to which the earth is subjected, has led to the employment of A. colored red by cochineal, in the thermometers sent out to the arctic regions. It acts as a poison by abstracting the water from the parts it touches. It is highly inflammable; its combustion yielding only carbonic acid and water. When mixed with water, heat is evolved, and a condensation takes place. The formula of A. is C_2H_5OH . In 100 lbs., therefore, of A., about 53 are carbon, 13 hydrogen, and 34 oxygen. Besides the A. consumed in wine, beer, and spirits, it is much employed in pharmacy and in the arts. It is a powerful solvent for resins and oils; and hence is employed in the preparation of varnishes. In Germany, a cheap spirit made from potatoes is much used for cooking on a small scale. See **METHYLATED SPIRIT**; and **ALCOHOL** and **ALCOHOLS**. The use and abuse of alcoholic drinks will be considered under **FOOD AND DRINK**, and **TEMPERANCE**.

ALCOHOL, PHYSIOLOGICAL AND POISONOUS ACTION. A. in a concentrated form exerts a local irritant action on the membranes and tissues of the animal body. According to various circumstances, as, for example, its greater or less dilution, the quantity in which it is administered, the emptiness or fullness of the stomach, and the nature of the animal on which the experiment is made, A. may either act as a gentle stimulus,

which assists the digestive process, or it may excite such a degree of irritation as may lead to the disorganization of the mucous membrane. It is well known that dilute A., in contact with animal matter, at a temperature of from 60° to 90°, undergoes acetic fermentation, and it was maintained by Leuret and Lassaigne that a similar change took place in the stomach. It appears, however, that only a small part of the A. undergoes this change; and it is the small part thus changed which produces the penetrating and disagreeable acidity which characterizes the eructations and vomited matters of drunkards. A. is, however, for the most part, rapidly absorbed in an unchanged state, either in the form of liquid or vapor; and this absorption may take place through the cellular (or connective) tissue, the serous cavities, the lungs, or the digestive canal. This is shown by the experiments of Orfila, who fatally intoxicated dogs by injecting A. into the subcutaneous cellular tissue, or by making them breathe an atmosphere charged with alcoholic vapor; and by Rayer, who injected about half an ounce of proof-spirit into the peritoneum of rabbits, which almost immediately became comatose, and died in a few hours. It is, however, only with absorption from the intestinal canal that we have to deal, in relation to man. Almost the whole of this absorption is effected in the stomach, and it is only when A. is taken in great excess, or is mixed with a good deal of sugar, that any absorption beyond the stomach occurs. The rapidity of the absorption varies according to circumstances. The absorption is most rapid when the stomach is empty and the drinker is fatigued; while the action is delayed by a full stomach, and especially by the presence of acids, tannin, or the mucilaginous and saccharine ingredients of many wines. Fatty matters have a similar action, and hence it is that (as we learn from Dr. Perrin's elaborate article on "The Physiology of Alcohol," in the *Dictionnaire Encyclopédique des Sciences Médicales*, vol. ii. p. 577, 1865) "we must account for the English habit of taking a very fat soup, or even a glass of oil, before proceeding *aux libations*." The mode of action of A. on the system, and the various phenomena of drunkenness, are sufficiently described in the article INTOXICATION. Previously to the year 1860, the actual presence of A. in the blood had been attempted to be proved by many chemists, but no satisfactory evidence upon this point had been adduced; and its presence had also been sought for in the expired air and in the secretions, but the results were equally doubtful; and Liebig's view, that A. was oxidized in the blood, and after passing through various stages of oxidation, was finally converted into, and eliminated from, the system as carbonic acid and water, was almost generally accepted. In that year, however, an elaborate work, abounding in well-devised experiments, and entitled *Du Rôle de l'Alcool et des Anesthésiques dans l'Organisme*, was published by three well-known physiological inquirers, MM. Lallemande, Perrin, and Duroy, and received a prize, with high commendation, from the academy of sciences. In this work, it seems to be proved beyond all doubt that "A. stays for a time in the blood, that it exercises a direct and primary action on the nervous centers, whose functions it modifies, perverts, or abolishes, according to the dose; that neither in the blood nor in the expired air are any traces to be found of its transformation or destruction; that it accumulates in the nervous centers, and in the liver; and that it is finally discharged from the system by the ordinary channels of elimination."—Perrin, *op. cit.*, p. 580. So far from carbonic acid being one of its final products, it is now ascertained that A. causes a diminished exhalation of that gas. The A., when it has entered the blood, is diffused over the whole organism, remains during, apparently, different periods in different organs, and almost immediately begins to escape; and if as much wine or spirit is taken as contains 80 grammes, or rather more than 2½ oz. of A., the urine passed some hours afterwards yields, by distillation, an amount of A. capable of burning; and the elimination by this channel continues for 16 hours or more. The elimination by the lungs continues for about 8 hours. The authors believe that in man the chief excreting channel is the skin, but they have no data to show how long this elimination is continued. They further show that when a quantity of *vin ordinaire*, equivalent to half an ounce of A., has been taken by a healthy man, the presence of A. may be readily detected in the blood, the expired air, the urine, and the cutaneous exhalation in the course of half an hour after the wine has been taken. In animals destroyed when intoxicated, the portions of the brain and of the liver are found to yield, weight for weight, considerably more A. than the blood. The fact of the retention and accumulation of A. in the nervous centers and liver, tends to throw much light on the special diseases of drunkards.

The action of any kind of alcoholic drink in moderate doses, is that of a somewhat rapid stimulant. The bodily and mental powers are for a time excited beyond their ordinary strength, after which there is a corresponding depression. Although the A. which is introduced into the system cannot act as a true food (for in that case it would not pass through the system unchanged), it indirectly takes the place of food, by diminishing the wear and tear of the system, and thus rendering less food sufficient: a fact which is proved by chemical experiments, showing that less carbonic acid and urea (which are the ultimate products of the carbonaceous and nitrogenous tissues) are given off when A. is administered in moderation, than when it is totally withheld.

The influence of an excessive dose of A. has been demonstrated by various series of experiments on animals, and unfortunately by many observed cases in man. If a poisonous dose of A. is given to an animal (a dog, for example), its action on the nervous system is the first point that is noticed. The dog ceases to exhibit the ordinary

control over its muscular movements, which seem to be no longer under the influence of the will. It walks with uncertain and doubtful steps, till the hind-legs lose their power, the fore-legs still preserving some activity. The general sensibility becomes more or less abolished, and the animal can no longer see or feel. Soon afterwards the respiration, fails; and finally, the circulation is arrested, and life ceases with the last beat of the heart.

ALCOHOLISM, the term employed to denote the symptoms of disease produced by alcoholic poisoning. In acute alcoholism, which is generally caused by the rapid absorption of a large quantity of alcohol, the first symptoms are animation of manner, exaltation of spirits, and relaxation of judgment. The emotions are altered and often perverted; muscular movements become irregular or ataxic; the mechanism of speech suffers. The further development of the symptoms presents three different series of effects. In the ordinary course of the action of the drug, headache, dizziness, disturbance of sight and hearing, and other troubles due to disorder of the central nervous system, ensue, leading to heavy sleep or profound coma, from which it is sometimes impossible to rouse the individual, who lies completely paralyzed, breathing stertorously. Sometimes the alcohol affects so strongly the centres of respiration and circulation that death is caused by paralysis of one or other, or both. This condition of coma requires to be carefully distinguished from opium poisoning. In the former, the face is usually flushed and the pupils dilated, while in the latter the face is pale and the pupils contracted; but these appearances are not constant. The odor of the breath is no criterion, inasmuch as sympathizing bystanders are apt to administer spirits in every case of depression, often with hurtful effects. The second class of effects is entirely different. Instead of sinking into stupor or coma, the individual becomes more and more excited, bursts into wild mirth or passionate anger, struggles violently with those who attempt to soothe him, and may grievously harm himself or others. This is the condition known as alcoholic mania—the physical explanation of many fearful crimes. After a longer or shorter period of fierce excitement, it is in most cases succeeded by great depression, and sometimes during this condition there may be sudden death from failure of the respiration or circulation. In the third division, the stage of excitement culminates in a convulsive seizure somewhat resembling that seen in hystero-epilepsy. The convulsions are repeated at intervals, are very complicated in character, and produce remarkable contortions of the body. These usually grow less violent, and, passing off, end in deep sleep; but here also death may occur from the action of the poison. Acute alcoholism is more apt to occur in those who are of unsound mind and weak nervous system, and this applies especially to the two last-described forms of the affection. In the treatment of acute alcoholism, it is sometimes necessary to wash out the stomach in case alcohol is present; but, from its rapid absorption, this is rarely the case. In the profound coma the administration of stimulants, such as ammonia, may be called for, and sometimes artificial respiration may be the only means of saving life. In the maniacal and convulsive forms of the affection, chloral, along with bromide of potassium, must be used. After the immediate symptoms have passed away in all forms, the individual must be carefully fed, on account of the disturbance of the digestive system which is caused by the overdose of alcohol, with nutrient enemata, along with remedies which will subdue the digestive irritation and stimulate the depression of the nervous system.

Chronic alcoholism is caused by the prolonged use of overdoses of various alcoholic drinks. Changes are caused in every tissue of the body, but the nervous, respiratory, and circulatory systems are more especially affected, together with the liver and kidneys. There is always more or less catarrh of the digestive organs, shown by dyspepsia, heartburn, vomiting—especially in the morning—and usually diarrhœa. The liver becomes enlarged from congestion, and afterwards shrinks, exercising pressure on the veins and bringing back blood to the heart from the abdominal viscera, leading to congestion of the bowels, hemorrhoids, and hemorrhages. From changes in the organs of circulation there is a tendency to palpitation, fainting, and breathlessness on exertion. These alterations are degenerations of the heart, which may be soft or even fatty; fibrous changes in the walls of the arteries; and dilatation of the capillaries from paralysis of the vaso-motor nerves. This last condition gives the florid complexion and mottled appearance to chronic drinkers. There is, besides, usually some congestion of the kidneys; but it is erroneous to attribute Bright's disease mainly to alcohol. The lungs are subject to chronic congestion and catarrh of the bronchial tubes and lung tissues. The muscular system suffers, the muscles becoming flabby and fatty. There is a great tendency to deposition of fat, and skin diseases are frequently induced by the vaso-motor changes.

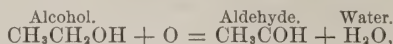
Two characteristic results of the action of the drug on the central nervous structures are *delirium tremens* and alcoholic insanity. See **INSANITY**. In treating chronic alcoholism the great point is to prevent the employment of alcohol in any form, and to invigorate the bodily and mental functions. In *delirium tremens* the patient must have sleep, which is best obtained by the use of bromide of potassium and chloral hydrate.

ALCOHOLOMETRY is the process of estimating the percentage of absolute alcohol in a sample of spirits. See **ARÆOMETER**.

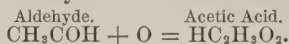
ALCOHOLS. During the last few years, our knowledge of the properties of ordinary alcohol and of the general class of bodies to which the term *Alcohols* is applied, in con-

sequence of their resemblance, in certain chemical reactions, to ordinary alcohol, has been very much enlarged. The alcohols are all compounds of carbon, hydrogen and oxygen, and are perfectly neutral to test papers. Many of them are produced along with ordinary alcohol in the process of fermentation, and alter the flavor of the resulting beverage: such are amyllic (fusel oil) and butylic alcohol. They are chiefly characterized by yielding, on treatment with acids, neutral bodies called ethers, the formation of water being a part of the reaction. According to the theory of chemical types (see TYPES, CHEMICAL), the alcohols are divided into monatomic (comprising the important series of methyl, ethyl, propyl, and other alcohols, which are referred to further below), and polyatomic. According to their behavior on oxidation, they are further divided into primary, secondary, and tertiary.

The action of oxygen on alcohol requires notice. In a nearly anhydrous state, alcohol has little tendency to oxidation, but when freely diluted and exposed to the air, it rapidly becomes oxidized into acetic acid. This conversion is, however, not a direct one, an intermediate compound, termed aldehyde (q.v.), being first formed, which is rapidly oxidized into acetic acid. The oxidation of alcohol into aldehyde is represented by the equation,

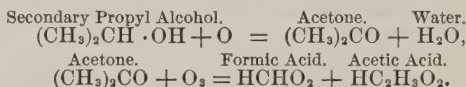


while the further oxidation of aldehyde into acetic acid is represented by



In the first reaction, alcohol loses two atoms of hydrogen, water being formed; in the second, aldehyde takes up one atom of oxygen.

Every alcohol which, like ordinary alcohol, yields on oxidation an aldehyde, and on further oxidation an acid having the same number of carbon atoms as the alcohol itself, is termed a primary alcohol. To take another example, primary propyl alcohol, $\text{C}_3\text{H}_7\text{OH}$, is oxidized first into propyl aldehyde, $\text{C}_3\text{H}_5\text{OH}$, and then into propionic acid, $\text{HC}_3\text{H}_5\text{O}_2$. Primary alcohols are subdivided into normal and iso-alcohols, but it would lead us too far to explain the meaning of this distinction. Secondary alcohols on oxidation lose two atoms of hydrogen, and are converted into bodies known as acetones or ketones, which differ from aldehydes inasmuch as they are not converted on oxidation into acids having the same number of carbon atoms, but are split up into acids having a smaller number of carbon atoms. Thus, secondary propyl alcohol is oxidized into acetone, and on further oxidation, acetone splits up into formic and acetic acids,



It will be observed that propyl alcohol and secondary propyl alcohol, propyl aldehyde and acetone, are respectively isomeric (see ISOMERISM).

Tertiary alcohols on oxidation give neither aldehydes nor ketones, but split up into acids having a smaller number of carbon atoms. Thus, tertiary butyl alcohol $(\text{CH}_3)_3\text{COH}$ which is isomeric, with primary and with secondary butyl alcohol, splits up on oxidation into acetic and formic acids. Only a comparatively small number of secondary and tertiary alcohols are at present known, and their properties and reactions have not been so thoroughly studied as those of the much more numerous class of primary alcohols. Theoretical considerations, however, lead to the belief that their number will be largely increased.

Ordinary or ethyl alcohol is monatomic—that is, it may be regarded as being derived from the type HOH , by the substitution of its radical ethyl, C_2H_5 , for one atom of hydrogen. This view is expressed by the formula $\text{C}_2\text{H}_5\text{OH}$.

The monatomic alcohols are more abundant than all the polyatomic alcohols together. There are several series of them, of which the most important are alcohols whose radical is of the form $\text{C}_n\text{H}_{2n+1}$ (as methyl, CH_3 ; ethyl, C_2H_5 ; propyl, C_3H_7 , etc.), and which are represented by the formula $(\text{C}_n\text{H}_{2n+1})\text{HO}$. They are intimately related to the fatty acids, whose general formula is $\text{C}_n\text{H}_{2n}\text{O}_2$, which may be formed from the alcohols by oxidation—O being substituted for H_2 . The three highest alcohols of this set, whose formulæ are $\text{C}_{16}\text{H}_{34}\text{O}$, $\text{C}_{27}\text{H}_{56}\text{O}$, and $\text{C}_{30}\text{H}_{62}\text{O}$, known as cetyllic, ceryllic, and melissylic alcohols, are solid waxy or fatty matters. Of the polyatomic alcohols, diatomic alcohols belong to the secondary water type, $(\text{H}_2\text{O})_2$ or $\text{H}_2\text{O}_2\text{H}_2$. Thus, the most important diatomic alcohol, glycol, $\text{C}_2\text{H}_6\text{O}_2$, is represented, according to the theory of types, by the formula $(\text{C}_2\text{H}_4)''\text{O}_2\text{H}_2$, its radical C_2H_4 being marked with two dashes to indicate that it replaces two atoms of hydrogen. So also there are tri-, tetra-, and heatomic alcohols corresponding to 3, 4, and 6 molecules of water, examples of which are glycerine, $(\text{C}_3\text{H}_5)''' \text{O}_3\text{H}_3$; erythrite (obtained from litmus), $(\text{C}_4\text{H}_6)'''' \text{O}_4\text{H}_4$; and mannite (from manna), $(\text{C}_6\text{H}_8)'''''' \text{O}_6\text{H}_6$.

Dry chlorine and absolute alcohol react on each other in a singular manner—the final product being a solid compound of alcohol with a very remarkable colorless oily fluid, called chloral, having a peculiar penetrating and irritating odor, and having the formula $\text{C}_2\text{Cl}_5\text{OH}$. By treatment with strong sulphuric acid, this chloral is set free, and may be

changed into chloroform by warming with an alkali. Dilute alcohol, distilled with chloride of lime (bleaching powder), yields chloroform; and this is the most economical process for obtaining this invaluable compound. Heated with an excess of sulphuric acid, alcohol loses all its oxygen in the form of water, and is converted into ethylene, the result being shown by the equation:



A less complete dehydration, under the action of sulphuric acid, converts alcohol into ether. The process is a complicated one, but the final result is expressed thus:



The best tests for discovering the presence of alcohol are—1. Its hot, pungent taste, its odor, and its great volatility. 2. Absorbed in asbestos, it burns with a pale blue flame, which deposits no carbon on white porcelain; and when burned in the mouth of an inverted test-tube, containing a few drops of the solution of baryta, it produces a well-marked deposit of carbonate of baryta—carbonic acid and water being the products of its combustion. 3. When boiled with sulphuric acid, and a few drops of a saturated solution of bichromate of potash, it reduces this salt to green sulphate of chromium. The chromium test, originally discovered by Dr. Thomson in 1846, is that on which the French physiologists Lallemand, Perrin, and Duroy relied in their investigations regarding the presence of alcohol in the blood, urine, expired air, etc. 4. The least trace of alcohol in an aqueous solution can be detected by adding a little chloride of benzoyl, and then a little caustic potash; benzoate of ethyl, a liquid having a very characteristic aromatic odor, is at once formed, and enables one thousandth part of alcohol in a teaspoonful of water to be detected.

Alcohol is of a double use to the chemist, inasmuch as it furnishes a cleanly and valuable fuel when used in the spirit-lamp, and possesses remarkable solvent powers without in general exerting chemical action on the dissolved substances. It dissolves many of the gases more freely than water, as, for example, nitrous oxide, carbonic acid, phosphuretted hydrogen, cyanogen, and the hydrocarbons, as, for instance, ethylene. Amongst the mineral substances which it dissolves may be mentioned iodine, bromine, boracic acid, the hydrates of potash and soda, the chlorides of calcium, strontium, magnesium, zinc, platinum, and gold, the perchloride of iron, corrosive sublimate, the nitrates of lime, magnesia, etc.; whilst among organic matters, it dissolves many organic acids, bases, and neutral bodies, the resins, the soaps, and the fats, which latter, however, dissolve more freely in ether than in alcohol. The alcoholic solutions of substances used in medicine are called *Tinctures*, *Spirits*, and *Essences*.

ALCORAN. See **KORAN**.

ALCORN, JAMES LUSK, 1816-94; b. Golconda, Ill.; lawyer; received a collegiate education; settled in Mississippi in 1844; representative and senator in the legislature in 1846-65; elected United States Senator but was not seated in 1865; elected governor in 1869 and defeated in 1873; United States Senator in 1871-7; founder of the levee system of Mississippi. The State Agricultural and Mechanical College for Colored Youth was named after him.

ALCOTT, AMOS BRONSON, b. Connecticut, 1799. He was the son of a farmer, and when young, went to Virginia as a peddler. Returning to New England, he became a successful teacher of children in Boston, remarkable for sympathy and skill in dealing with the very young; but he gave up his school, and at Concord, Mass., began the study of natural theology, civil and social science, and reforms, especially in education and diet. He visited England in 1842, and brought back with him Charles Lane and H. G. Wright, and the three founded a community, near Harvard, Mass. The Englishmen soon went home, the community farm was sold, and A. went to Concord, where he afterwards lived as a peripatetic philosopher, speaking occasionally to the public in other places, when invited, on a wide range of subjects, from divinity to practical cookery. A. was admired for brilliancy and suggestiveness. His points of importance in treating of man physically are: race, complexion, diet, and government. He published *Orphic Sayings*, *Tablets*, *Concord Days*, etc. In his theology he always cultivated the mystical element, and in later years his teachings showed a decided tendency towards the evangelical view of Christianity. He d. 1888. See *Memoir* by Sanborn and Harris (1893).

ALCOTT, LOUISA MAY, American authoress, was a daughter of Amos Bronson Alcott, and was born at Germantown, Penn., Nov. 29, 1832. After teaching for a time, she made literature her profession, interrupting this work by service as a hospital nurse during the civil war. She died Mar. 6, 1888. Her first book, *Flower Fables*, appeared in 1855, and was followed by *Hospital Sketches* (1863); *Moods* (1864), a tale; and a number of books for children, of which *Little Women* (1868, continued 1870), *An Old-Fashioned Girl* (1869); *Little Men* (1871), its sequel, *Jo's Boys* (1866), were especially popular. A biography of Miss Alcott was published in 1889. Her sister MAY, Madame ERNEST NIERIKER (1840-79) studied art in Boston, London, and Paris, painted still life and landscapes, copied Turner's works with much success, and published *Concord Sketches* and *Art Study Abroad* (1879).

ALCOTT, WILLIAM ALEXANDER, 1798-1859; b. Connecticut; cousin of A. Bronson, an American author. When young he worked on a farm in summer and taught school in winter. He studied medicine at Yale, and assisted Woodbridge in preparing his geog-

raphies, at the same period editing the *Juvenile Rambler*, the first serial for children issued in America. He also edited *Annals of Education*, and worked with Gallaudet, Hooker, and others for school reform, gaining a premium for a paper *On the Construction of School Houses*. In 1832, he removed to Boston and published *The Young Man's Guide*. Within 20 years of lecturing he visited more than 20,000 schools, making addresses to most of them. His works are more than a hundred in number, nearly all of a reformatory character.

ALCOVE (Spanish *alcoba*, which is derived from the Arabic *el-kauf*, a tent), an architectural term, denoting a sort of niche or recess in a chamber where one may recline, or where a bed may be placed. An A. is either hung with curtains or closed with doors during the day. It was known to the ancients, and at one time very common in France, when the immoderate size of the apartments rendered it absolutely necessary as a preventive against the cold during sleep. It is no longer fashionable, the most eminent physicians having declared it to be prejudicial to health.

ALCOY, a t. of Spain, in the province of Alicante, a portion of the former kingdom of Valencia. It is "built in a funnel of the hills, on a tongue of land hemmed in by two streams, with bridges and arched viaducts." The houses hang picturesquely over the terraced gardens and ravines. The walls of A. are of clay, and suffered considerable damage during the last war; but the town contains some new edifices, and has numerous manufactories. "Here is made the *papel de hilo*, the book *Librito de fumar*, which forms the entire demiduodecimo library of nine tenths of Spaniards, and with which they make their *papelitos*, or little paper cigars." An insurrection broke out here in 1873, but was put down by the regular army. A. is also famous for its sugar-plums, and manufactures coarse woolen cloth. It has a consistory, town-hall, poor asylum, public granary, etc. Pop. about 30,000.

ALCUDIA, MANUEL DE GODOY, DUKE OF, known as the prince of peace, was b. at Badajoz, in Spain, 12th of May, 1767. Poor, but handsome and musical, at the age of twenty he entered the king's body-guard at Madrid, and soon became a favorite of the weak Charles IV., as well as of his queen. Honors and emoluments flowed in rapidly. In 1801, he led the Spanish army against the Portuguese, and signed the treaty of Badajoz. In 1804, he was made generalissimo of the Spanish forces on sea and land, and invested with unlimited power. The alliance of Spain with France, and the war with England which ensued, in spite of the sums paid by Spain to secure neutrality, the defeat of Trafalgar, and consequent check to commerce—all tended to exasperate the public mind, and a court-party was formed against him, with the prince of Asturias at its head. A. now resolved to shake off the French alliance, and to treat secretly with the Lisbon court. But however cautiously taken, his warlike measures reached the ears of Napoleon, and determined him to carry out his project of dethroning the Bourbons. Meanwhile, the people had been further exasperated against the favorite by his unprincipled accusations against the prince of Asturias; and when, in 1808, Charles abdicated in favor of his son, the duke's life was only saved by the promise of his trial. This trial, however, never took place. Napoleon, who knew his influence over the minds of their Spanish majesties, had him liberated, and brought to Bayonne, where he instigated all measures taken by the ex-king and queen, retaining their favor till their death. After his fall, he lived chiefly in France. In 1808, his income had been estimated at five million piastres. After the revolution of 1830, we find him subsisting in Paris upon a small pension bestowed by Louis Philippe. In 1847, his return to Spain was permitted, and his titles, together with great part of his wealth, restored. He died at Paris, Oct. 7, 1851.

ALCUIN, or FLACCUS ALBINUS, the most distinguished scholar of the 8th c., the confidant and adviser of Charlemagne, was b. at York about the year 735. He was educated under the care of archbishop Egbert, and his relative, Aelbert, and succeeded the latter as master of the school of York. Charlemagne became acquainted with him at Parma, as he was returning from Rome, whither he had gone to bring home the *pallium* for a friend; and in the year 782, this monarch invited him to his court, and availed himself of his assistance in his endeavors to civilize his subjects. A. became the preceptor of Charlemagne himself, whom he instructed in the various sciences. To render his instructions more available, Charlemagne established at his court a school called *Schola Palatina*, the superintendence of which, as well as of several monasteries, was committed to him. In the learned society of the court A. went by the name of Flaccus Albinus. Most of the schools in France were either founded or improved by him. Among others, he founded the school in the abbey of St. Martin, in Tours, 796, taking as his model the school of York, and in this school he himself taught after his retirement from court, 801. While living at Tours, he frequently corresponded with Charlemagne. At his death, in 804, he left, besides numerous theological writings, a number of elementary works on philosophy, mathematics, rhetoric, and philology; also poems, and a great number of letters. His letters, while they betray the uncultivated character of the age generally, show A. to have been the most accomplished man of his time. He understood Latin, Greek, and Hebrew. Good editions of his works appeared in 1777 and in 1873. See the life of A. by Lorenz, 1829; Monnier's *A. et Charlemagne*, 1864; Mullinger's *Schools of Charles the Great*, 1877, and West's *Alcuin and the Rise of Christian Schools*, 1892.

ALCYONE, the most brilliant of the seven stars or pleiades, and supposed by Maedler to be the central sun in reference to which our sun with its planets and all other known systems are moving, or perhaps revolving within some almost incomprehensible period of time. Argelander has shown that this cannot be true.

ALCYONE, or **HALCYONE**, in classic legend, daughter of Æolus, and wife of Ceyx, so inconsolable on the death of her husband that she threw herself into the sea, whereupon she and her husband were changed into kingfishers as a reward of their mutual devotion.

ALCYONIUM, a genus of coelenterata, type of an order called Alcyonaria, belonging to the class Actinozoa (see article ZOOLOGY), and consisting of a polype-mass with starlike peres and protrusive polypes. *A. digitatum* is extremely common on the British shores, on stones, old shells, etc., in deep water. It sometimes appears as a mere crust, about the eighth of an inch in thickness, but commonly rises up in rounded cones, and often assumes forms which have procured for it the popular name of *dead man's fingers*, and other similar appellations. The polype-mass is gelatinous within, and covered with a sort of leathery skin, the mass being traversed by a multitude of minute canals, terminating on the outer surface in starlike figures, which, if the whole is placed in seawater, are seen to project considerably from the surface, and appear as polypes with eight tentacula or feelers; so that what seems to be a disgusting fleshy mass in the fisherman's net, proves to be, when placed in its proper element, a structure of wonderful beauty and full of animal life, existing under peculiar and wonderful conditions. The manner in which the polypes protrude and retract themselves has been likened to that in which the horns of a snail are protruded and retracted. Their tentacula are short, obtuse, and elegantly fringed at the margins. The external part of the body of the polype is a membrane so transparent, that by the employment of a magnifying glass the whole internal structure can be seen through it. This delicate membrane, however, is composed of two very thin membranes, intimately united, the outer of which increases in thickness at the base of the polype, coalesces with that of adjacent polypes, and is continuous with the common leathery skin of the polype-mass. The inner membrane retains its extreme delicacy throughout; it extends into and lines the cell of the polype and the tube or canal which proceeds from the cell into the mass, and is thus also continuous with the corresponding membranes of other polypes; for the canals divide into branches in their course from the base of the polype-mass to the surface, and the intimacy of union in the whole is increased by a fine tubular net-work which occupies the spaces between the principal canals. If a portion of an *A.* is irritated, not only the particular polypes immediately subjected to irritation retract themselves as to withdraw from danger, but the gradual collapse and contraction of the whole polype-mass shows that the irritation has been felt through it all. The contraction of the mass is owing to a discharge of water, which the polypes, when protruded, imbibe, and which circulates through and distends the polype-mass, so that when the polypes are undisturbed, and in full activity, it has twice or three times the size which it has as we find it cast out upon the beach. The stomach of each polype is cylindrical and beneath it is a comparatively large cavity, into which hang loosely eight twisted filaments or threads, the use of which is not well ascertained, and has been the subject of very different opinions among naturalists. In the gelatinous substance of the polype-mass, which fills the interstices of the tubular net-work, numerous crystalline calcareous spicula lie immersed, like the *raphides* (q.v.) found in the intercellular passages of some plants. They are toothed on the sides, but are of various forms, and have no organic connection with any part of the animal structure; their only use apparently being to impart some degree of strength to the whole. These spicula are of general occurrence in zoophytes of this order, and are secreted by the common skin of the polype-mass. The polype-mass increases by *gemme* or buds, which grow into new branches; but the propagation of the species takes place by *ova* or eggs, which first appear as minute smooth warts on the membrane of the canals in the interior. The constriction of the neck, by which they grow, separates them from the parent membrane, and they move through the canal by means of very minute vibrating cilia or hairs with which they are furnished, until they reach the stomach of a polype, into which they enter, and through which they more slowly proceed till at last they are ejected by the mouth (the only opening), and committed to the waves and tides. The ova seem as if capable of feeling whilst within the parent mass, and may be observed to move backwards and forwards, and to contract their sides as if by voluntary action in their passage through the body of the polype. These wonderful phenomena of nature are the more easily observed because the ova are of a deep vermilion color, beautifully contrasting with the pure white of the polype, through the tunic of which they are seen.—One of the most remarkable known species of *A.*, and the largest, is that called *A. poculum* or Neptune's cup, which was discovered by Sir Stamford Raffles upon the coral-reefs of Sumatra, and is found in the neighborhood of Singapore. It grows erect, sometimes attaining nearly 3 ft. in height and 18 in. in diameter. Specimens are now frequent in museums.

The name alcyonium was formerly also given to many zoophytes now found to be of very different structure, some of which now bear the name *alcyonidium*, others that of

alcyonella. The genus *alcyonidium* belongs to the class of zoophytes called *polyzoa*, order *infundibulata*. See ZOOPHYTES. The north-eastern coast of the U. S. has a species, *A. carneatum*. The most common British species, *alcyonidium gelatinosum*, resembles a sponge in appearance, but is more pellucid and gelatinous, and is full of polypes, each having 15 or 16 long slender tentacula. It is attached to old shells and stones, and is sometimes much lobed; the color varying from pale brown to clear yellow; the surface is speckled with minute dots, from which, when it is placed in sea-water, the polypes protrude. The polype differs widely from that of alcyonium in having an intestine, which, proceeding from the stomach to the aperture of the cell, opens there by an orifice distinct from the mouth, a difference characteristic of the classes to which they respectively belong. The ova are clothed with cilia, and their motions either are or most strikingly resemble voluntary motions.—*alcyonella* belongs to the class *polyzoa*, order *hypocreptia*. See ZOOPHYTES. There is one British species, *alcyonella stagnorum*, found in stagnant waters, especially in autumn, in shapeless, jelly-like masses, of a blackish-green color, usually adhering to the leaves of aquatic plants. The jelly-like mass is traversed from base to surface by multitudes of tubes, which open by a roundish or 5-angled aperture; the heads of the polypes project a little way from the aperture, and expand into a circle of about fifty tentacula. About 1600 polypes are situated on a square inch of the surface of the mass. The number of tentacula on a specimen of moderate size has been computed at more than 5,000,000. The tentacula are covered with minute cilia, only to be observed with a high magnifying power, by means of which a constant whirlpool is maintained, centering in the mouth of the polype, and essential, probably, for breathing as well as for the supply of food. Each polype is organically connected with the mass, its tunic being continuous with the tube. The alimentary canal has two openings. The ova are to be found in vast numbers in the tubes which traverse the mass. They are dark brown, whilst the tubes are colorless or tinted with green, of a lens-like form and destitute of cilia. They are produced from all parts of the inner side of the gelatinous tubes; and as there seems to be no aperture for their escape, it is supposed that they are liberated from the parent mass only on its death and decomposition. The *alcyonella* is an interesting object in a fresh-water aquarium, but is rather difficult to preserve. It is not, however, always to be found, even in ponds where it might be expected, and is abundant in particular seasons and rare in others. The ova are probably capable of remaining long dormant, until some concurrence of circumstances favors the development of the germ of life which they contain. See Johnson's *History of British Zoophytes*, 2 vols., Lond. 1847—a most interesting and valuable work.

ALDAN a river of Siberia, in the government of Yakutsk; rises in 55° n. and 125° e. It flows 300 m. n.e., turns n.w. and joins the Lena 100 m. above Yakutsk. Its length is unknown, but it is probably between 900 and 1300 m.; it is in part navigable.

ALDAN MOUNTAINS, a branch of the Stanavoi mountains running from the main chain in the direction of Aldan river. Some think the name ought to be given to the whole mountain system of eastern Siberia.

ALDBOROUGH, a t. in England, 16 m. n.n.w. of York. A. formerly had two members of parliament, but was disfranchised by the reform act of 1832. The t. is remarkable for ancient ruins. It was the Isurium of the Romans, and remains of aqueducts, buildings, tessellated pavements, implements, urns, and coins have been found. Population, 1891, 7467.

ALDEBARAN, the Arabic name of a star of the first magnitude, in the constellation Taurus. It is the largest and most brilliant of a cluster of five which the Greeks called the Hyades. From its position it is sometimes termed "the bull's eye."

ALDEGONDE, SAINT, PHILIP VAN MARNIX, baron of, 1538–98; a Dutch statesman, educated at Geneva, a strong Calvinist and a leader among the nobles who protested against the establishment of the inquisition in the Netherlands in 1566. He was the friend of William of Orange, who gave him several important missions, and sent him in 1572 to the first Dutch states-general at Dort. He was envoy to Paris, to London, and to the diet of Worms. As burgomaster of Antwerp in 1584 he defended that city against the duke of Parma, and in 1590 he was again ambassador to France. He left a metrical version of the Psalms, and at his death was translating the Bible into Flemish.

ALDEGREVER, or **ALDEGRAF**, HEINRICH, 1502–63; a German painter and engraver. From his style, which closely resembles his master's, he has been called the "Albert Dürer of Westphalia." His engravings put him in the first rank of "little masters." Specimens of his paintings are very rare.

ALDEHYDE, CH_3COH is a volatile fluid produced by the oxidation and destructive distillation of alcohol and other organic compounds. Its discoverer, Döbereiner, called it *light oxygen ether*; its present term is an abbreviation of *alcohol dehydrogenitum*, its composition being represented by that of alcohol from which two atoms of hydrogen have been abstracted. In the article on this subject in Watts's *Dictionary of Chemistry*, ten different modes of obtaining this substance are given. It is sufficient here to state that the best modes of preparing it may be found in that work, or any recent treatise on organic chemistry. It is a thin, transparent, colorless liquid, very inflammable, burning with a blue flame, and having a spec. gr. of 0.800, a boiling point of about 70° F. (21° C.), and a pungent, suffocating odor. It mixes in all proportions with water, alcohol, and

ether, and dissolves sulphur, phosphorus, and iodine. As is shown in the article ALCOHOL, it constitutes an intermediate stage in the oxidation of alcohol into acetic acid. A. is susceptible of combination with many other bodies, organic and inorganic. With hydrocyanic acid it forms aldehyde-hydrocyanide, $\text{CH}_3 \cdot \text{CHOH} \cdot \text{CN}$; convertible by the action of acids or alkalies into lactic acid, of which it is really the nitril. With sodium-bisulphite, A. forms a crystalline compound, aldehyde-sodium-bisulphite, $\text{CH}_3 \cdot \text{CHOH} \cdot \text{Na}_2\text{SO}_3$, from which the aldehyde can be regenerated by treatment with an acid. A. readily combines with ammonia, forming aldehyde-ammonia, $\text{C}_2\text{H}_4\text{ONH}_3$, which is obtained in transparent shining crystals, and is a compound that has led chemists to the discovery of a large number of very remarkable derivatives.

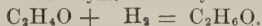
ALDEHYDES are a class of organic compounds, intermediate between alcohols and acids; the ordinary aldehyde, described in the preceding article, being, as we have seen, intermediate between ordinary alcohol and its corresponding acid—viz., acetic acid. Each aldehyde is derived from the corresponding alcohol by the abstraction of two atoms of hydrogen, and each aldehyde is converted into its corresponding acid by the addition of one atom of oxygen.

Ten A. of the form $\text{C}_n\text{H}_{2n}\text{O}$, corresponding to $n = 1, 2, 3, 4, 5, 7, 8, 11, 12$, and 16, are at present known, the simplest being formic aldehyde, CH_2O , and the highest being palmitic aldehyde, $\text{C}_{16}\text{H}_{32}\text{O}$.

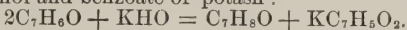
Amongst A. not connected with the preceding group may be mentioned various organic compounds which have been recently shown to belong to this class—thus, acrolein, $\text{C}_3\text{H}_4\text{O}$, is acrylic aldehyde; camphor, $\text{C}_{10}\text{H}_{16}\text{O}$, is campholic aldehyde; bitter-almond oil, $\text{C}_7\text{H}_6\text{O}$, is benzoic aldehyde; oil of cumin, $\text{C}_{10}\text{H}_{12}\text{O}$, is cuminic aldehyde; oil of cinnamon, $\text{C}_9\text{H}_8\text{O}$, is cinnamic aldehyde. Most of these A. are obtained directly from plants, and either exist in them ready formed, or are given off as volatile oils on distillation with water.

Owing to their great tendency to oxidize into their corresponding acids, the aldehydes are powerful reducing agents. They reduce the silver in silver salts to the metallic state. On the other hand, by the action of nascent hydrogen upon the aldehydes, the corresponding alcohols are regenerated. Thus, ordinary alcohol may be obtained from ordinary aldehyde.

Acetic Aldehyde. Ethyl Alcohol.



With the acid sulphites of the alkalies the aldehydes form sparingly soluble crystalline compounds. When treated with caustic alkali, the aldehydes are converted into the corresponding alcohols, and the potassium salt of the corresponding acid. Thus benzoic aldehyde yields benzyl alcohol and benzoate of potash:



The aldehydes have a great tendency to form polymeric compounds. Thus, ordinary aldehyde passes readily into two polemeric modifications (see ISOMERISM): (1) par-aldehyde, a liquid which does not boil till 255°F . (124°C .); (2) metaldehyde, a solid body which sublimates at 212°F . (100°C .), and is converted into ordinary aldehyde by heating to 239°F . (115°C .) for a few hours in a closed vessel. In Naquet's *Principes de Chimie, fondée sur les Théories Modernes* is found a full account of the aldehydes derived from the monatomic alcohols, of the modes of preparing them, of the properties common to all aldehydes, and those specially belonging to different series, the rational formulæ and constitution of aldehydes, and the aldehydes derived from diatomic alcohols or glycols, in which this chemist includes not only salicylous, salicylic, and glycolic aldehydes, but that remarkable synthetic product, furfural. See FURFURAMIDE.

ALDEN, HENRY MILLS, author and editor, b. 1836; became editor of *Harper's Magazine* in 1864; published *God and His World* (1893), and *A Study of Death* (1895).

ALDEN, JAMES, 1810-77, a rear-admiral in the U. S. navy. He was in the Wilkes exploring expedition, and in the naval operations of the Mexican war; and 1848 to 1860 in the coast survey. In the civil war he commanded the steamer *South Carolina*, and in 1862 the sloop-of-war *Richmond*. He was engaged in the capture of New Orleans, and the attacks of Vicksburg and Port Hudson; commanded the sloop *Brooklyn*, the leading ship of the line, in 1864, and was in the Mobile bay and Fort Fisher conflicts. In 1868, he was commandant of the California navy yard; in 1869, chief of the bureau of navigation in the navy department; and in 1871 he took command of the European squadron.

ALDEN, JOHN, b. England, 1599, d. Duxbury, Mass., Sept. 12, 1687; one of the pilgrims to Plymouth, Mass. He was one of the signers of the compact in the cabin of the "*Mayflower*." A. married Priscilla Mullens, to whom his first proposal was in behalf of Miles Standish, but who indicated her preference for A. over the soldier. A poem by Longfellow has this incident for its theme. He was a magistrate for more than 50 years, and greatly assisted in the government of the infant colony.

ALDEN, JOSEPH, D.D., LL.D., b. New York, 1807; graduated at Union college, 1829; studied theology at Princeton, and was ordained pastor of a congregational church in Massachusetts, 1834. He was professor in Williams college, 1835-52; in Lafayette college, 1852-57; president of Jefferson college, 1857-67, and later principal of the New York state normal school at Albany; published many educational works. D. 1885.

ALDEN, NOAH, an advocate of religious liberty in Massachusetts, as against the old union of church and state, and a member of the convention that ratified the federal constitution. For 30 years, beginning 1766, he was pastor of the Baptist church in Bellingham, and he represented that t. in the state constitutional convention.

ALDEN, TIMOTHY, D.D., 1771-1839; b. Massachusetts; graduated at Harvard; pastor of a congregational church in Portsmouth, 1799-1805, and a prominent teacher there, and in Newark, Boston, New York, and Cincinnati. He was the founder and first president of Allegheny college, Meadville, Pa., and author of *Missions Among the Senecas*, a book of epitaphs, and other works.

ALDER (*Alnus*), a genus of plants of the natural order *betulaceæ* (regarded by many as a sub-order of *amentaceæ*, See BIRCH and AMENTACEÆ. The genus consists entirely of trees and shrubs, natives of cold and temperate climates; the flowers in terminal, imbricated catkins, which appear before the leaves; the male and female flowers in separate catkins on the same plant; the male or barren catkins loose, cylindrical, pendulous, having the scales 3-lobed, and each with three flowers whose perianth is single and 4-partite; the fertile catkins oval, compact, having the scales sub-trifid, and each with two flowers destitute of perianth; styles, two; fruit, a compressed nut without wings. See illustration, BOTANY, vol. II., figs. 17-21.—The COMMON or BLACK A. (*A. glutinosa*) is a native of Britain, and of the northern parts of Asia and America. It has roundish, wedge-shaped, obtuse leaves, lobed at the margin and serrated. See illustration, HAZEL, ETC., vol. VII., fig. 7. The bark, except in very young trees, is nearly black. It succeeds best in moist soils, and helps to secure swampy river-banks against the effects of floods. It attains a height of 30 to 60 ft. Its leaves are somewhat glutinous. The wood is of an orange-yellow color, not very good for fuel, but affording "one of the best kinds of charcoal for the manufacture of gunpowder, upon which account it is often grown as 'oppee-wood.' Great numbers of small A. trees are used in Scotland for making staves for herring-barrels. The wood is also employed by turners and joiners; but it is particularly valuable on account of its property of remaining for a long time under water without decay, and is therefore used for the piles of bridges, for pumps, sluices, pipes, cogs of mill-wheels, and similar purposes. The bark is used for tanning and for dyeing, also for staining fishermen's nets. It produces a yellow or red color, or, with copperas, a black color. The leaves and female catkins are employed in the same way by the tanners and dyers of some countries. The bark is bitter and astringent, and has been used for gargles, and also administered with success in ague. The seeds are a favorite food of greenfinches.—The A. is one of the ornaments of many of the most exquisite landscapes in Britain. The dark green of its foliage, and the still darker hue of its bark, contrast beautifully with the colors of the other trees with which it is usually associated on the banks of our rivers. In boggy grounds it is often almost the only kind of tree that appears, and in many parts of the highlands, groups of alders are scattered over the lower and moister parts of the mountain-slopes. The individual tree, viewed by itself, may be regarded as somewhat stiff and formal in appearance; but in groups or clusters it is always far otherwise.—The common A. ceases on the Swedish shore of the gulf of Bothnia, in the s. of Angermannland, and is there called the *Sea A.*, because it is only in the lowest grounds near the sea that it occurs.—The GRAY or WHITE A. (*A. incana*), a native of many parts of continental Europe, especially of the Alps, and also of North America, and of Kamtchatka, but not of Britain, differs from the common A. in having acute leaves, downy beneath, and not glutinous. It attains a rather greater height, but in very cold climates and unfavorable situations appears as a shrub. It occurs on the Alps at an elevation above that to which the common A. extends, and becomes abundant also where that species disappears in the northern part of the Scandinavian peninsula. The wood is white, fine-grained, and compact, but readily rots under water. The bark is used in dyeing.—*A. cordifolia* is a large and handsome tree, with cordate acuminate leaves, a native of the s. of Italy, but found to be quite hardy in England. Some of the American species are mere shrubs. The bark of *A. serrulata*, found from s. New England to Wisconsin, Kentucky, and Florida, is used in dyeing. *A. viridis* ranges from n. New England to the shore of lake Superior, and northward and southward to North Carolina. Several species are natives of the Himalayas.—The BERRY-BEARING A., or A. BUCKTHORN, is a totally different plant. See BUCKTHORN.

ALDERMAN, a title derived from the Anglo-Saxon *ealdorman*, compounded of *ealdor* (older) and *man*. Whether any definite and invariable functions were connected with the ancient rank of *ealdorman*, does not seem to be very clearly ascertained. The term was generally applied to persons of high and hereditary distinction, such as princes, earls, and governors. Its special signification in the titles "A. of all England" (*aldermannus totius Angliæ*) and "king's A." (*aldermannus regis*) is not distinctly indicated. There were also aldermen of counties, hundreds, cities, boroughs, and castles. In modern times, aldermen are officers invested with certain powers in the municipal corporations of England, Wales, and Ireland, either as civil magistrates, or as accessors of the chief civil magistrates in cities and towns corporate. The corresponding title in Scotland is bailie. The London court of aldermen consists of 26 aldermen, including the lord mayor, and constitutes the bench of magistrates for the city, besides having judicial and legislative authority in the corporation. In the majority of American cities A. are a legislative body, having limited judicial powers in matters of internal police regulation, etc.,

though in many cities they hold separate courts and have magisterial powers to a considerable extent.

ALDERNEY (Fr. *Aurigny*; Lat. *Aurinia*), an island in the English channel (see CHANNEL ISLANDS), lat. $49^{\circ} 45'$ n., long. $2^{\circ} 13'$ w., separated from the coast of Normandy by a strait about 7 m. in breadth, called the race of Alderney. Through this channel, which is very dangerous in rough weather, the remnant of the French fleet escaped after their defeat at La Hogue in 1692. The distances between Alderney and the nearest points of Guernsey, Jersey, and Great Britain are respectively about 15, 33, and 60 m. The length of the island is about 4 m., the breadth about $1\frac{1}{4}$. The coast to the s.e. is bold and lofty, to the n.e. and n. it descends, forming numerous small bays, one of which, that of Crabby, affords the only anchorage in the island. A harbor of refuge and breakwater have been constructed on the n. side of the island, the extensive works connected with which have greatly increased the population; 6 m. to the w. are the caskets, a small cluster of rocks on which are three light-houses. The soil in the center of the island is highly productive; and the A. cows, a small but handsome breed, have always been celebrated. The climate is mild and healthy, and good water abounds. The population has been steadily on the decrease for some time. In 1891 it was 1843; in 1881, it counted 2039. Education to some extent is universal. The population was originally French, but half the inhabitants now speak English, and all understand it. Protestantism has prevailed here since the reformation. A. is a dependency of Guernsey, and subject to the British crown. The civil power is vested in a judge appointed by the crown, and six *jurats* chosen by the people. These, with twelve popular representatives or *douzainiers* (who do not vote), constitute the local legislature. The court of justice is composed of the judge and jurats, the royal procureur and comptroller and the registrar (*greffier*), nominated by the governor. There is a local militia, consisting of two companies of infantry and a brigade of artillery. The "town," situated in a picturesque valley near the center of the island, contains a few public buildings, among which is the old church, said to have been erected in the 12th century.

ALDERSHOT CAMP. When England and France declared war against Russia in 1854, in relation to Turkish affairs, the British army was known to be in an unsatisfactory state; 39 years of peace had allowed many important elements in military organization to fall into a state of inefficiency. Among others, the power of acting well together in brigades and divisions had scarcely been taught to the soldiers, who had been familiar with little more than the discipline and tactics of battalions and companies. To remedy in part these defects was the object held in view in establishing the camp at A. It was to be a permanent camp, with barracks and huts, instead of mere canvas tents; and was to be provided with all the appliances for a military school, valuable to officers as well as to privates. A dreary waste, on the confines of Surrey, Hants, and Berks, called A. heath, was purchased by the government as the locality for the new camp. The area was 7063 acres, and the purchase-price about £130,000. The spot was deemed suitable as being distant from any thickly inhabited district; as being within easy reach of three or four stations on the South-western and South-eastern railways; and as being conveniently placed for the quick transmission of troops to any part of the southern coast. The camp was ready for the reception of troops in 1855. At first, no brick structures were attempted. The soldiers were accommodated in wooden huts, each furnishing living and sleeping room for about 25 men. When the camp was inaugurated, in April of the year last named, by a review at which the queen was present, there were 18,000 troops, regulars and militia, temporarily stationed there. The huts for each regiment were grouped apart, for the better maintenance of regimental discipline. Each hut had a range of iron bedsteads on either side, capable of being doubled up; and a long table through the middle, in a line with two doors at the ends of the huts. The officers' huts, though of course superior in construction and convenience, were as simple as they could well be. The cooking was performed in huts especially set apart for that purpose, provided with efficient cooking apparatus. The wooden huts have gradually been superseded by brick barracks at a cost of more than a quarter of a million sterling. These may be fully described as affording in many ways examples of the finest barracks hitherto constructed in this country. The Basingstoke canal, running directly across the heath, has occasioned a division into north camp and south camp; but each of these is susceptible of a good deal of extension. Reviews and sham-fights are frequently held, at some of which the queen has been present, and there are various important operations carried on daily, and known to very few besides those immediately concerned. There are many square m. of plain, heath, shrub, morass, valley, and hill surrounding the camp, on which soldiers, and especially the militia regiments, are exercised in the various evolutions and strategic movements connected with the battle field and siege-works. It is no child's play; the men are often severely worked, and gain a foretaste of some of the fatigues of military life. On other days, they are exercised in various quiet duties of tents and huts, barracks and kitchens, intended to teach them many of the useful knacks in which French soldiers are acknowledged to be more skilled than the English. Different regiments, regulars as well as militia, artillery as well as cavalry and infantry, take it in turn, to experience camp-life at A. There are usually about from 10,000 to 15,000 troops at the camp, comprising infantry, cavalry, artillery, and militia. The war authorities some

years ago purchased or leased a portion of forest-land between A. and Winchester; camping arrangements of a temporary kind are made, and the troops are occasionally exercised with a tough march of a dozen miles. A town has sprung up near the camp. Pop. about 12,600.

ALDHELM, 656-709; an English divine during the Saxony heptarchy; the first Englishman who wrote Latin poetry. He was abbot of Malmesbury, bishop of Sherborne, and afterwards of Salisbury. He is known by two works, *De Virginitate* and *De Laude Virginum*.

ALDINE EDITIONS, the name given to the works that issued from the press of Aldo Manuzio (Lat., Aldus Manutius, q.v.) and his family in Venice; 1490-1597. Recommended by their intrinsic value, as well as by their handsome exterior, they have been highly prized by the learned and by book-collectors. Many of them are the first editions (*editiones principes*) of Greek and Roman classics; others contain corrected texts of modern classic writers, as of Petrarch, Dante, Boccaccio, etc., carefully collated with the MSS. All of them are distinguished for the remarkable correctness of the typography; the Greek works, however, being in this respect somewhat inferior to the Latin and Italian. The editions published by Aldus, the father, form an epoch in the annals of printing, as they contributed in no ordinary measure to the perfecting of types. No one had ever before used such beautiful Greek types, of which he got nine different kinds made, and of Latin as many as fourteen. It is to him, or rather to the engraver, Francesco de Bologna, that we owe the types called by the Italians *corsivi*, and known to us as italics, which he used for the first time in the 8vo edition of ancient and modern classics, commencing with Virgil, 1501. Manuzio's impressions on parchment are exceedingly beautiful; he was the first printer who introduced the custom of taking some impressions on better paper—that is, finer or stronger than the rest of the edition. The first example of his is afforded in the *Epistolæ Græcæ*, 1499. It would be difficult to name another who has brought so much zeal, disinterestedness, taste, and knowledge to the furtherance of literature, especially classical literature. After his death, in 1515, his business was superintended by his father-in-law, Andreas Asulanus. Paul, the son of Aldus, possessed the same enthusiasm for Latin classics that his father had for Greek. He died at Rome in 1597. The printing establishment founded by Aldo continued in active operation for 100 years, and during this time printed 908 different works. The distinguishing mark is an anchor, entwined by a dolphin, generally with the motto, *Sudavit et alsit*. Under the direction of the grandson of the founder, it lost the superiority which it had formerly maintained over all the other printing-presses in Italy. The demand which arose for editions from this office, and especially for the earlier ones, induced the printers of Lyon and Florence, about 1502, to begin the system of issuing counterfeit Aldines. The Aldo mania has considerably diminished in later times. Among the A. works which have now become very rare may be mentioned the *Horæ Beatae Mariæ Virginis* of 1497; the *Virgil* of 1501; and the *Rhetores Græci*; not to mention the editions from 1494 to 1497, which are now extremely rare. The most complete collections known are those of the former grand duke of Tuscany, and of Renouard, the bookseller of Paris. In 1834 appeared a third edition of the monograph published by Renouard, *Annales de l'imprimerie des Aldes, ou Histoire des Trois Manuces, et de leur éditions; par A. Renouard*, Paris, 1834. Ebert has published a catalogue of all the authentic A. E. in the supplement to Vol. I. of his *Bibliographical Dictionary*.

ALDINI, GIOVANNI, 1762-1834; nephew of Galvani, and brother of Count Antonio Aldini; a student of natural science. He held the chair of physics at Bologna. His chief work was in experiments to apply science to useful purposes: galvanism, gas for lighthouses, and fireproof cloth receiving most attention. He was one of the founders of the national institute of Italy; received the British royal society's gold medal, and was made knight of the iron crown, and counselor of state at Milan.

ALDRICH, HENRY, D.D., 1647-1710, was an eminent English theologian and philosopher. He was prominent in the controversy with the Roman Catholics during the reign of James II. He was also eminent as a composer of sacred music, and composed a number of anthems and church service that are still frequently used in cathedrals. One of his best-known compositions in the lighter style is, "Hark, the bonny Christ-Church bells." He was the author of a *Compendium Artis Logicæ*, used as a manual in Oxford for nearly a century.

ALDRICH, NELSON W., b. R. I., 1841; he received an academic education, but became a merchant. He was president of the Providence common council, 1872-3; member of state general assembly, 1875-6, and during the latter year speaker; member of XLVI. and XLVII. congresses; republican member U. S. senate, 1881; re-elected, 1887.

ALDRICH, THOMAS BAILEY, b. Portsmouth, N. H., 1836. He intended to enter college, but on his father's death went into his uncle's counting-room in New York, remaining three years, frequently writing verses for the newspapers; was reader for a publishing house, then a regular writer for the *New York Evening Mirror*, and an editor of the *Home Journal* and the *Saturday Press*. He has contributed to the leading magazines. His first volume of poems was *The Bells*, 1855; followed by *Babie Bell*, *Pampinea*, *Cloth of Gold*, etc. Among his prose works are *Story of a Bad Boy*, *Prudence Palfrey*, *Marjorie Daw*, *Judith and Holofernes*, etc. He was editor of *Every Saturday*, and of the *Atlantic Monthly* (1881-90).

ALDRIDGE, IRA, 1810 (?)–67, the “African Roscius.” There are two accounts of him, one that he was a mulatto born near Baltimore about 1810, apprenticed to a German ship-carpenter, and accompanying Edmund Kean to England as a servant; returned in 1830 or ’31, and appeared on the stage in Baltimore; failed and returned to England, where he gained high reputation. The other story is that he was the son of a native of Senegal, who was brought here as a slave, became a Christian and pastor of the African church in Church st., New York; that Ira was born in that city about 1805, and intended for the ministry; that he was fond of dramatic performances, but his father disapproved, and sent him to England to be educated for the ministry; that he still preferred the drama, and made his début at the Royal theater, London, in “Othello,” and was remarkably successful. He played also “Zanga,” “Orozembo,” “Rolla,” and other characters that were color-parts, throughout England. On the continent he took high rank in Shakspeare’s tragedies and kindred characters, and he had presents of crosses and medals from the emperors of Austria and Russia, and the king of Prussia. He was actual or honorary member of many of the great academies. He married an English woman, whom he left a widow in London. At the time of his death he was on his way to St. Petersburg, where he had an engagement, and expected to appear in New York in the following September.

ALDROVANDI, ULYSSES, one of the most distinguished naturalists of the 16th c., was born at Bologna, probably about the year 1523. He was descended from a noble family, and received an excellent education, partly in his native city and partly in Padua. Some of his religious opinions having been called in question, he traveled to Rome in 1550, to vindicate himself; and whilst there, studied Roman antiquities, and wrote a treatise on ancient statuary. At Rome, he formed the acquaintance of Rondelet. On his return home, he devoted himself to the study of botany, and having taken his degree in medicine at the university of Bologna in 1553, he was in the following year appointed to the chairs of philosophy and logic, and also to the lectureship on botany. He practiced medicine for some time in Bologna, and appears after a short time to have exchanged some of the chairs which he held in the university for that of natural history, to the study of which science he applied himself with great devotedness. He established the botanical garden at Bologna in 1567. He was much employed, during many years, in forming a museum of natural history, collecting specimens with great assiduity, and employing draughtsmen to make figures of them for the great work on natural history which he contemplated. In the pursuit of his favorite science, he traveled into different countries, but no particular record of his travels remains. Inspiring others with a zeal similar to his own, he had the pleasure of seeing his museum rapidly increase. He finally bequeathed it to the senate of Bologna, and it became the foundation of the splendid public museum of that city, where many of A.’s specimens remain to this day. He left behind him also at his death a prodigious mass of valuable manuscripts, which still remain in the public library of Bologna, a store of which proper use has never yet been made, and in which there is probably much correspondence of eminent men, interesting as showing the first steps of progress of the science of natural history, after the long dormancy of the middle ages. All his studies and collections were made subservient to his work on natural history; the first volume of which—on birds—appeared in 1599. Six volumes appeared during A.’s life; other seven were published under the direction of his colleagues and pupils after his death, which took place in 1605 or 1607. It has been stated in many notices of his life, and was long commonly believed, that, by his scientific pursuits, A. reduced himself to circumstances of great poverty, and that he died in a public hospital at Bologna; but the story, although Bayle has adopted it in his dictionary, rests on no sufficient evidence, and there is reason to think that it is not true. It is difficult to procure a complete edition of the works of A., and the volume on minerals is especially rare. A. has been censured for excessive copiousness in things of little importance, and at best merely serving to illustrate his subject and render it interesting. He shows, however, great anxiety to set forth all that is known on every subject of which he treats; he writes of natural history in a way which shows that he greatly loves the science, and at the same time with a devout and reverent spirit, always beholding in the works of creation the traces of the Creator’s hand.

ALD STONE, or **ALSTON**, a market-t. of the co. of Cumberland, England, 30 m. e.s.e. from Carlisle. The parish of A. contains extensive and very productive lead mines, formerly belonging to the earls of Derwentwater, and now to the lords commissioners of the admiralty. The t. has manufactures of worsted yarns and flannel. It is situated in a mountainous district on the declivity of a steep hill, near the confluence of the Nent and south Tyne. The pop. is about 3500. Alston Moor, an upland tract lying to the south, contains, with Garrigill, about 2500 inhabitants.

ALE would seem to have been the current name in England for malt liquor in general before the introduction of hops. This took place, according to Johnston (*Chemistry of Common Life*), as late as the reign of Henry VIII., about the year 1524. As the use of hops was derived from Germany, the German name for malt liquor (*bier*), *beer*, was used at first to distinguish the hopped liquor from *ale*, the unhopped. The word *ale* had in all likelihood been introduced by the Danes and other Scandinavian settlers—for *æl*

(allied probably to *oi'*) is still the name for malt liquor in the Scandinavian tongues—and must have driven out the *beer* of the Anglo-Saxons, which that people had in common with the other Teutonic nations. As now used, ale signifies a kind of beer (q. v. and FERMENTATION), distinguished chiefly by its strength and the quantity of sugar remaining undecomposed. Strong ale is made from the best pale malt; and the fermentation is allowed to proceed slowly, and the ferment to be exhausted and separated. This, together with the large quantity of sugar still left undecomposed, enables the liquor to keep long without requiring a large amount of hops. The Scotch ales are distinguished for the smallness of the quantity of hops they contain, and for their vinous flavor. They are fermented at an unusually low temperature. The ales of Edinburgh and Prestonpans have a high reputation. Burton ale is the strongest made, containing as much as 8 per cent of alcohol; while the best brown stout has about 6 per cent, and common beer only 1 per cent. India pale ale differs chiefly in having a larger quantity of hops.

ALEAN'DRO, GIROLAMO (HIERONYMUS), 1480–1542, studied at Venice, and got great reputation for learning, and in 1508 went to Paris, on invitation of Louis XII., to be professor of belles-lettres and rector in the university. He was sent on missions to Rome, where Leo X. kept him as librarian of the vatican. In 1520 he was papal nuncio at the coronation of Charles V., and next year Luther's chief opponent in the diet of Worms, going to the utmost extremes to suppress the doctrines of the reformer, and becoming so violent that he lost the friendship of Erasmus. He drew up the edict against Luther, and after the diet went as nuncio to the Netherlands, where he lighted the fires of persecution—two monks of Antwerp, the first martyrs of the reformation, being burned at his instigation, at Brussels. In 1523 Clement VII. sent him to the court of Francis I., and he was taken prisoner with that monarch at the battle of Pavia (1525), and released only after paying a heavy ransom. In 1538 he was made cardinal. His account of the diet of Worms is an important historical source. See Brieger, *Aleander and Luther*, 1884.

A-LEE, expressed by the French *sous le vent*, or “under the wind,” is a maritime term applied to the position of the helm when so worked as to bring the head of the ship to windward.

ALEKO PASHA (Prince ALEXANDER VOGORIDES) was b. in Bulgaria, 1830, and was the third son of Prince Alexander Végorides, prominent in the Crimean war. A. in early life was attached to diplomatic corps in Berlin, London, and Vienna, and was Turkish ambassador at Vienna for a short time during the Russian war, 1877. When e. Roumelia was made a province, 1878, he was appointed governor-general, but resigned, 1880, suspecting disaffection in the national assembly.

ALEMAN, LOUIS, b. 1390; archbishop of Arles and cardinal of St. Cecelia. He was one of the presidents of the council of Basle in 1431, and led the party for the supremacy of the councils over the pope in opposition to the claims of Eugenius IV., and on his motion the latter was deposed and Felix V. elected in his stead. Eugenius thereupon deposed Felix, and deprived A. of his ecclesiastical dignities, but these were restored by Nicholas V. in 1447—Felix having resigned on A.'s advice. In 1527 A. was canonized by pope Clement VII.

ALEMAN', MATEO, a famous Spanish novelist, was b. about the middle of the 16th c., at Seville, and d. in Mexico during the reign of Philip III. In 1604 he published a poetical biography of St. Antonius of Padua; and in 1608, while in the new world, an *Ortografía Castellana*, written during his voyage; but his great work is *Guzman de Alfarache*, a novel with a rogue for the hero, like some of the more recent English fictions. It was first published at Madrid in 1599, became immensely popular, and in half a dozen years had gone through 26 editions, consisting of not less than 50,000 copies, in Spain and other countries. Both as regards the delineation of manners and the purity of style, this masterly creation of A. ranks next to that most celebrated of all the Spanish novels of the same character—the *Lazarillo de Tormes* of Mendoza. It displays keen powers of observation, and is readily recognized as the work of a ripe and cultivated mind. Mendoza's hero has the advantage in originality, freshness, and vivacity; but Guzman exhibits a richer variety of gifts in the various characters he is compelled by circumstances to assume, such as stable-boy, beggar, thief, coxcomb, mercenary, valet, pander, merchant, etc. The manners of the author's own age are hit off with great skill and effect, and a wide knowledge of human nature is manifested.

ALEMAN'NI (that is, *all-men*), the name of a military confederacy of several German tribes which began to appear on the lower and middle Main about the beginning of the 3d c. Caracalla fought with them first on the Main in 211 A.D., but without conquering them; Alexander Severus was equally unsuccessful; but Maximinus at length succeeded against them, and drove them beyond the Rhine. After his death they again invaded Gaul, but were defeated by Posthumus, who pursued them into Germany, and fortified with ramparts and ditches the boundary of the Roman territory, called the *Agri Decumates*. The mounds near Pförung, on the Danube, the rampart extending through the principality of Hohenlohe to Jaxthausen, and the ditch with palisades on the n. side of the Main are remains of these works. The A., however, did not desist from their incursions, although they were repeatedly driven back. After 282, being pressed upon from the n.e. by the Burgundians, they took up permanent settlements

within the Roman boundary from Maintz to lake Constance. At last, Julian came (357) to the relief of Gaul, which had been suffering from the incursions of the A., and soon compelled eight of their chiefs to sue for peace. Their united force, in their principal battle with Julian, amounted to 35,000 men. After the 5th c., the confederated nation is spoken of as A. and Suavi or Suevi. In the course of the 4th c. they had crossed the Rhine, and extended as far w. as the Vosges, and s. to the Helvetian Alps. At length Clovis, king of the Franks, broke their power in 496, and made them subject to the Frankish dominion. The s. part of their territory was formed into a duchy, called *Alemania*. The name of Swabia came afterwards to be applied to the part of the duchy lying east of the Rhine. From the A. the French have given the name of *Allemands* and *Allemagne* to Germans and Germany in general, though the inhabitants of the n. of Switzerland, with those of Alsace and part of Swabia, are the proper descendants of the Alemanni.

ALEMBERT, JEAN LE ROND D', one of the most distinguished mathematicians and writers of the 18th c., was b. in Paris, Nov. 16, 1717. He was the illegitimate son of Madame de Tencin, a lady of considerable notoriety in the time of the regency, and of a M. Destouches. He was exposed by his mother on the steps of the church of St. Jean-le-Rond, and the policeman who found him committed the seemingly dying infant to the care of the wife of a poor glazier, thinking it too weak to be taken to the dépôt. The father, without publicly avowing the child, secured to him an allowance of 1200 francs a year. At the age of 12, he entered the college Mazarin, where he soon gave indication of that inclination, or rather passion for mathematical studies which distinguished him through life. On leaving college, he returned to the humble home of his kind foster-mother, where he continued to live and pursue his favorite studies for nearly 40 years, sharing with her household his small revenue. Although the good woman loved him as a son, so little did she encourage his exclusive devotion to science, that when he spoke of his discoveries or writings, she replied with a sort of pity: "You will never be anything but a philosopher; and what is a philosopher, but a fool who torments himself during his life, that people may talk about him when he is dead?" At first, his friends urged him to qualify himself for some profitable career; but after trying for a time the study of law, and then of medicine, he gave up the attempt as hopeless, and abandoned himself without reserve to his passion for science. In 1741, at the age of 23, he was admitted a member of the academy of sciences, having already attracted attention by several physico-mathematical tracts. Two years later appeared his *Treatise on Dynamics*, founded on a new and fertile principle which makes an epoch in mechanical philosophy. "This principle consists," says Condorcet, "in establishing the equality, at every instant, between the changes which the motion of the body has undergone, and the forces which have been employed to produce them;" in other words, it reduces all the laws of motion to the consideration of equilibrium. Among the more important of his other scientific works are: his *Theory of the Winds*, which gained the prize of the academy of Berlin, 1746, and which contains the first conception and use of the calculus of partial differences; a treatise on the *Precession of the Equinoxes*, 1749, giving for the first time an analytical solution of that phenomenon, as well as of the nutation of the earth's axis; *Essay on the Resistance of Fluids*, 1752; *Researches on some Important Points in the System of the Universe*, 1754 and 1756. His *Mathematical Opuscules* contain an immense number of memoirs, some on new subjects, some containing developments of his previous works.

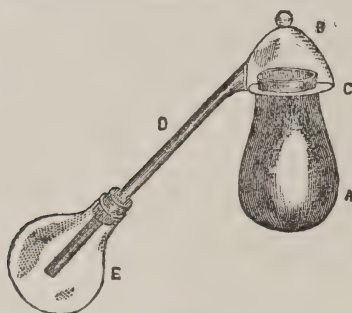
But A. did not confine himself to physical science. Diderot (q.v.) having conceived the idea of the famous *Encyclopédie*, enlisted the services of A., who wrote the *Preliminary Discourse*, which is allowed by all to be a noble tribute to literature and philosophy—a model of lucid and eloquent exposition, and displaying an immense extent of knowledge combined with rare judgment. Besides numerous articles in the *Encyclopédie*, he published *Elements of Philosophy*, 1759; *Mélanges of Literature and Philosophy*; *The Destruction of the Jesuits*, etc. He also wrote a great many *éloges* of members of the academy of sciences, of which he was elected secretary in 1772. His literary works have been published in a collected form, new edition, by Bossange, Paris, 1821, 5 vols. 8vo. This edition contains the correspondence of A. with Voltaire and the king of Prussia. His scientific works have never been collected.

A. gave striking proof of how little he regarded riches and distinctions, or the flatteries of the great, and how genuine was his love of independence. Frederick II. of Prussia offered him the presidency of the academy of Berlin, 1752, but he declined to leave France, and only accepted a subsequent offer of a pension of 1200 fr. The king of France granted him a similar sum. In 1762, Catherine II. of Russia invited him, through her ambassador, to undertake the education of her son, with a salary of 100,000 fr.; and when he declined, she wrote him a letter with her own hand, urging that to refuse to contribute to the education of a whole nation was inconsistent with his own principles; and inviting him, if he could not reconcile himself to the breaking-off of his pursuits and friendships, to bring all his friends with him, and she would provide both for them and for him everything they could desire. But A. remained steadfast. When the grand duke afterwards visited Paris, he good-humoredly reproached A. with his refusal; and to the excuse of the rigor of the climate and feeble health, the prince

replied, with the compliment: "In truth, monsieur, it is the only false calculation you have made in your life." A. was never married. He was tenderly attached for many years to a Mademoiselle Espinasse, although their intimacy, it is believed, never went beyond a warm friendship. The death of the lady was a severe blow to A. His own health began to give way; for he was suffering from the stone, and would not consent to an operation. He died Oct. 29, 1783.

A. was truthful, frank, and extremely benevolent. He held it as a principle of morals that a man has no right to dispose at will of his own superfluous means while there are others in want of the necessities of life. A stigma has attached to the name of A. from his intimate association with Voltaire and other assailants of Christianity; but A. never attacked religion in his published writings, which might be read without knowing what his opinions regarding revelation were. It is only from his private correspondence that it appears that he thought the probabilities were in favor of theism.

ALEM'BIC (formed by the Arabs from their article *al* and Gr. *ambix*, a goblet) is a form of still introduced into chemistry by the alchemists, and used by the more ancient experimenters in manipulative chemistry for the distillation and sublimation of substances, such as alcohol, or formic acid obtained by heating a decoction of red ants in water.



Alembic.

The vessel consisted of a *body*, *cucurbit* or *matrass* (A), in which the material to be volatilized was placed; a *head* or *capital* (B) into which the vapors rose, were cooled, and then trickled down to the lower part (C), from whence by a *pipe* (D) the distilled product passed into the *receiver* (E). Where very volatile liquids were being distilled, it was customary to introduce the receiver (E) into a vessel with cold water, so as to increase the perfectness of the condensing part of the arrangement. The A. has now been entirely superseded by the retort and receiver, or by the flask attached to a Liebig's condenser. See RETORT.

ALEMTE'JO, a province in the s. of Portugal; area, 9417 sq.m.; pop. '90, 393,000. It is partly washed by the Atlantic on the w., and stretches to the Spanish frontier on the e. It is traversed by a number of mountain-chains, and is watered by the Tagus, Guadiana, and Saado or Sado. In the s. and w., the climate is hot and dry; the plains are covered with brown heath, unrelieved by a tree or a shrub, and only broken at intervals by marshy wastes, while the vegetation is extremely scanty. In the e., on the contrary, the valleys are fertile, and the mountains adorned with forests. The productions are singularly abundant. They consist of wheat, barley, rice, maize, the vine, and a variety of choice fruits—such as the citron, the lemon, the fig, the pomegranate. In the valleys, the principal trees are the oak with edible fruits, the evergreen oak, the cork-oak, the chestnut, and the pine; in the plains, we find lavender, rosemary, juniper, the myrtle. The pasturage, also, is extraordinarily fine. Great attention is paid to the rearing of swine, goats, and sheep, and, in a less degree, of horned cattle, asses, and mules. As the population is sparse, more grain is produced than is consumed; but manufactures are in a backward condition. Even mining, which might be very profitably carried on, is neglected. The chief towns are Evora (the capital), Elvas, Portalegre, Beja, Estremoz, and Mertola.

ALEN'CON, chief t. of the department of Orne, in France, is situated on the Sarthe, in lat. 48° 25' n., and long. 0° 54' e. The town-church—a structure of the 16th c., containing the remains of the tombs of the A. family, which were almost completely destroyed at the revolution—is built in the Gothic style. It has a fine porch and exquisitely painted windows. A. is a clean and handsome t., with good streets and a delightful public walk. The inhabitants produce excellent woolen and linen stuffs, embroidered fabrics, straw-hats, lace-work, artificial flowers, hosiery, etc. The manufacture of A. point-lace (*points d'A.*), although still important, is not carried on to the same extent as formerly. The cutting of the so-called A. diamonds (quartz-crystals), found in the vicinity of the t., is a branch of industry which has also greatly declined. Pop. '91, 18,319.

The old DUKES of A. were a branch of the royal family of Valois, and were descended from Charles of Valois, who perished at the battle of Crecy in 1346. His grandson, John I., fell at Agincourt in 1415. His successor, John II., allying himself with the enemies of the court, was twice condemned to death, but pardoned both times. René, son of John II., also excited, not without cause, the suspicion of the French monarch, Louis XI., who confined him for three months in an iron cage at Chinon; but as the parliament had never condemned him, he was released at the death of Louis, and restored by Charles VIII. to his title and estate. René's son, who had married the sister of Francis I., was general of the advance-guard of the French army in the Netherlands. He

commanded the left wing at the battle of Pavia, where, instead of supporting the king at a critical moment, he fled with his troops; and to him, therefore, has been attributed both the disastrous defeat sustained by the French, and his sovereign's falling into the hands of the enemy. With him expired the old house of A. The duchy was then given to the duke of Anjou. Louis XIV. conferred it upon the duke of Berri, and Louis XVI. on the count of Provence.

ALENIO, GIULIO, about 1582-1649, a Jesuit missionary, b. in Brescia, Italy. He joined the order of Jesuits in 1600, and went to China in 1610. There he adopted the dress and manners of the country, and labored for nearly thirty years to spread Christianity. He was the first Christian to labor in the province of Kiang-Si, and also built several churches in the province of Fo-Kien. He became master of the Chinese language, and composed a number of works, the most important being a *Life of Christ* and a *Cosmography*.

ALEPPO, a t. in the n. of Syria, capital of a Turkish vilayet of the same name, between the Orontes and the Euphrates, on the banks of the little desert stream, Nahr-el-Haleb. It stands in a large hollow, surrounded by rocky hills of limestone. The fruitful gardens, celebrated for their excellent plantations of pistachios, are the sole contrast to the desolation which environs the city, whose numberless cupolas and minarets, clean, well-paved streets, and stately houses, make it even yet one of the most beautiful in the east. It is a telegraph station in connection with Damascus, and with Diarbekir, on the Indo-European line, and contains 127,000 inhabitants, Mohammedans, Greeks and Armenians. Formerly, it supplied a great part of the east with fabrics of silk, cotton, and wool, and gold and silver stuffs; but in 1822 an earthquake swallowed up two-thirds of the inhabitants, and transformed the citadel into a heap of ruins. The plague of 1827, the cholera of 1832, and the oppression of the Egyptian government, all but completed its destruction. During the sway of the last, however, a new citadel and some other edifices were erected; but scarcely half of the mosques and baths have been rebuilt. The aqueduct is the oldest monument of the town. A. is one of the principal emporiums of the inland commerce of Asia. Its port is Alexandretta or Iskanderoun (q.v.). A. has a large trade in cotton and silk goods, skins, tobacco, wine, oil, etc. Aleppo was once the centre of Saracenic power, still retains much of the Arabic character, and its citizens are famed throughout the east for their elegant manners.

ALES', or **ALESSE'**, ALEXANDER, original name ALANE, 1500-65; a native of Edinburgh. He studied at St. Andrew's, graduating in 1515; became canon of the collegiate church, and contended vigorously for scholastic theology as against the reformers. On the execution of Patrick Hamilton his views entirely changed, though he kept the fact a secret for a long time. For a sermon against dissoluteness among the clergy he was put in prison, whence he escaped to the continent, traveled in Europe, and settled in Wittenberg, where he made the acquaintance of Melancthon. Meantime he was tried in Scotland, and condemned for heresy, without a hearing. After Henry VIII. broke with the church of Rome, A. went to England, and was cordially received by the king and Cranmer and Cromwell, and through the latter's influence he was appointed lecturer on theology at Cambridge. In 1539, he was again compelled to exile himself in consequence of the statute known as the "Six Articles." He was at once chosen to a theological chair at Frankfort-on-the-Oder, and was the first professor who taught the reformed doctrines. In 1543, he quitted Frankfort for Leipsic, where he filled a similar professorship until his death.

ALESIA, a t. of ancient Gaul, the siege and capture of which form one of Cæsar's greatest exploits. The Gauls were making a last effort to shake off the Roman yoke; and Vercingetorix, their bravest leader, after several defeats, had shut himself up with 80,000 men in A., there to await the reinforcements which he expected from a general insurrection of the country. The t. was situated on a lofty hill, and well calculated for defense. Cæsar, with his army of 60,000 men, completely surrounded the place, with the view of starving it into a surrender. He fortified his position by two lines of ramparts of prodigious extent and strength; one towards the t., for defense against the sallies of the besieged; the other towards the plain, against the expected armies of relief. Before they could assemble, 250,000 strong, he was ready for them; and all their assaults, combined with the desperate efforts of the besieged, were of no avail. A. was obliged to surrender, and Vercingetorix was made prisoner. A. was afterwards a place of some note under the empire, but was destroyed by the Normans in 864. Near the site of the ancient A., w. of Dijon, stands the modern village of Alise or Sainte-Reine.

ALESSANDRES KU, GREGORY, b. 1812; a Roumanian poet. He served in the army; was a liberal politician, and was banished to a monastery for publishing satires reflecting upon the government. In 1859 A. was minister of finance. He wrote *Reminiscences*, *Impressions*, *Letters*, and *Fables*.

ALESSANDRIA, the principal fortress and town of the province of the same name in the n. of Italy, is situated in a marshy country near the confluence of the Bormida and Tanaro. It was built in 1168 by the inhabitants of Cremona, Milan, and Placentia, as a bulwark against emperor Frederick I. Its original name was Cæsarea, but it was afterwards called A. in honor of pope Alexander III., who established a bishopric in it. Designed at first as a fortress to guard the passage of the Bormida and Tanaro, and be-

ing the central point of intercourse between Genoa, Milan, and Turin, the town has frequently been the object of sanguinary strife. It was taken and plundered in 1522 by duke Sforza; besieged, but without success, by the French, under the prince of Conti, in 1657; and again taken, in spite of an obstinate resistance, by prince Eugene in 1707. After the prostration of Austria at the battle of Marengo in 1800, Bonaparte concluded an armistice at A. with his enemies, according to which, upper Italy, as far as the Mincio, was ceded to the French, with twelve fortresses. It was the principal armory of the Piedmontese during the insurrection of the Lombardo-Venetian states in 1848-9, when many new fortifications were added to it. At present, the citadel is one of the strongest fortresses in Europe; of enormous size, larger, it is said, than many a town, and in the event of a war in Italy, the whole surrounding country can be inundated by means of the sluices of the Tanaro. A. contains (1894), 74,200 inhabitants, who carry on a considerable trade in linens, woollens, silk fabrics, stockings, hats, etc. The culture of flowers is also much attended to. Two fairs are held in A. annually, which are largely frequented. The province has an area of 1950 sq. m. and a pop. (1894) of about 730,000. It is a fertile plain on the e., and the w. is hilly and wooded.

ALEUTIAN ISLANDS, or the CATHERINE ARCHIPELAGO, is the name of a group of islands, numbering above 150, and consisting of several clusters, which now belong to the United States, and form an insular continuation of the N. American peninsula of Alaska (q. v.), in the shape of an arch or bridge between the former continent and Asia. They lie in 55° lat., separating the sea of Kamtchatka from the Pacific, and naturally subdivide themselves into five groups: 1. the Komandorski islands, sometimes not regarded as belonging to the A. I.; 2. the Sasignan, or "Nearest" islands; 3. the Rat islands; 4. the Andreianowsky, which are very small and little frequented; 5. the Fox islands, among which is Unimak, the largest in the archipelago. The islands are all craggy, and have a desolate appearance from the sea. They exhibit traces of violent internal commotion. Several volcanoes are still periodically active, and warm volcanic springs are numerous. The whole chain or group forms a connecting link between the volcanic range of the west coast of America and Kamtchatka. On account of the numerous rocks which lie off their shores, they are not very accessible to ships. Under a climate which exchanges only for a short time the monotonous rigor of winter for a cloudy spring and a hot summer, little can be expected of so niggardly a soil. There are plenty of low scrubby bushes, grasses, moss, and lichens, but no strong and stately growth of trees. An experiment tried at Unalaska of planting pines had very little success. Here and there, however, European kitchen-gardens have been attempted with better results; and the cultivation of the potato has been undertaken. The islands abound in springs, and are overrun with foxes, dogs, and reindeer, while the coasts swarm with fish, seals, and otters. The natives, numbering only 900 in 1890, though once numerous, are variously regarded as of Asiatic or American origin. There are two tribes, the Oonalaskans and the Atkhas. In appearance they closely resemble the Innuits or Esquimaux. Reduced in numbers by the cruelty of their Russian masters, they have since suffered terribly from pestilences. A large majority of them have become Christianized. Their occupation is hunting and fishing. Their trade is chiefly in furs and fish, of which the principal *entrepôt* is Alexandria, in the island of Rojak. They are a strong and agile race, capable of enduring great fatigue and extremes of heat and cold. The inhabitants of Fox Island live in peculiar dwellings consisting of large underground holes divided into compartments and having several entrances. Many of their utensils are made of stone and they are still classed by ethnologists with the dwellers in the Stone Age. Their food consists of the flesh of seals, otters, fish, etc. Their weapons are lances, spears, harpoons and arrows. Until they were Christianized they appear to have worshipped the spirits of the stars, sun, and moon, and to have differed from many tribes, in the same condition of savagery, in having no idols. Singular matrimonial customs formerly prevailed among them. There was no marriage ceremony and a system of polygamy was practised, each man taking as many wives as he wished and sending them back when weary of them. See illus., N. and S. AMERICA, vol. I.

ALEWIFE (*Alosa tyrannus*), a fish of the same genus with the shad (q. v.), which, in the end of spring and beginning of summer, appears in great numbers on the eastern coast of N. America, and enters the mouths of rivers to spawn. It appears in Chesapeake bay in March, on the coasts of New York and New England in April, and on those of the British provinces about the 1st of May. It abounds in the bay of Fundy, but is more rare in the gulf of St. Lawrence; and the bay of Miramichi appears to be its northern limit. It ascends rivers only as far as the tide extends, and, after spawning, returns to the sea in the middle of summer. It prefers a soft, muddy bottom. Its length is not more than 12 inches. The A. is called *spring herring* in some places, and *gaspereau* by the French Canadians. It is inferior to the herring, yet it is a valuable fish. The fishery is prosecuted in the rivers, by small-meshed seine-nets, set across the stream. Large quantities are taken in the rivers of New England, New Brunswick, and Nova Scotia. The harbor of St John's, New Brunswick, alone produces from 12,000 to 20,000 barrels annually. This fish, in a salted state, forms a considerable article of export from the northern parts of America to the West Indies.

ALEXANDER, a co. forming the s.w. corner of Illinois, between the Ohio and Mississippi rivers; 230 sq. m.; pop. '90, 16,563. It is low, flat, and subject to inundations in some portions, but produces good corn and wheat. The Illinois Central railroad intersects this county. Co. seat, Cairo.

ALEXANDER, a co. in n.w. North Carolina, bounded on the s. by the Catawba river; 278 sq.m.; pop. '90, 9430, with colored. The chief products are wheat, corn, and oats. Co. seat, Taylorsville.

ALEXANDER, ARCHIBALD, D.D., 1772-1851; b. Virginia; a Presbyterian minister of Scotch descent. He was self-educated; was led to religious study in the revival of 1789, was licensed to preach in 1791, and spent some years as an itinerant missionary; was president of Hampden-Sidney college, 1789-1801; in 1802 married the daughter of Rev. Dr. Waddell, the blind preacher whose eloquence was so eloquently eulogized by William Wirt; was pastor of Pine street Presbyterian church, Philadelphia, 1807-12; and having at the organization of the theological seminary of the Presbyterian church at Princeton, N. J., been unanimously chosen professor of theology, he retained the position with eminent success until his death. His best known work is *Outlines of the Evidences of Christianity*, which has been translated into many languages and is a textbook in colleges. He wrote also *Treatise on the Canon of the Old and New Testaments*; *History of the Patriarchs*; *History of the Israelitish Nation*; *Religious Experience*; *African Colonization*; *The Log College*; and *Moral Science*, which was published after his death.

ALEXANDER, JAMES WADDELL, D.D., 1804-59; b. Virginia; son of Dr. Archibald; graduated at Princeton college, 1820, and afterwards a tutor there; installed pastor of Presbyterian church at Charlotte C. H., Va., 1827, and of 1st church of Trenton, N. J., 1829; professor of belles lettres and Latin in Princeton college, 1833-44; pastor of Duane street church, New York, 1844-49; professor of ecclesiastical history, church government, and sacred rhetoric in Princeton seminary, 1849-51, when the Duane street church being reorganized as the Fifth avenue church at the corner of 19th street, he again became its pastor and continued to be until his death. He wrote for the *Biblical Repository*, *Princeton Review*, *Presbyterian*, American Sunday School Union, American Tract Society, and, under the name "Cesariensis," for the *Literary World*. Among his many works are *Consolation*; *Sacramental Discourses*; *Thoughts on Family Worship*; *Plain Words to a Young Communicant*; *Thoughts on Preaching*; *The American Mechanic and Workingman*; *Discourses on Christian Faith and Practice*; and a biography of his father.

ALEXANDER, JOHN HENRY, 1812-67; b. Maryland; author of *Treatise on Mathematical Instruments*, *Contributions to the History of Iron*, *Dictionary of Weights and Measures*, *International Coinage*, and other valuable works.

ALEXANDER, JOSEPH ADDISON, D.D., 1809-60; one of the most eminent American biblical scholars; son of Dr. Archibald; b. Philadelphia. He was a pupil of his father; graduated at Princeton college, 1826; was adjunct professor there of ancient languages and literature, 1830-33; instructor, associate professor, and professor of oriental and biblical literature in Princeton seminary, 1833-51; of church history and government, 1851-59; of New Testament literature and biblical Greek, 1859-60. Among his published writings are *The Psalms Translated and Explained*; *The Prophecies of Isaiah*; a treatise on church government; two volumes of sermons; and commentaries on books of the New Testament. See his *Life* by H. C. Alexander (1869).

ALEXANDER, STEPHEN, LL.D., b. New York state, 1806; educated at Union college and Princeton theological seminary; became a tutor in Princeton college, 1833; adjunct professor of mathematics there, 1834-45; professor of mathematics, 1845-54; and professor of astronomy from 1840 to his retirement about 1877 as professor emeritus. During a part of this time he was also professor of natural philosophy. In 1860 he was at the head of the expedition to Labrador to observe the solar eclipse of July 18. He is the author of many scientific papers, chiefly astronomical, such as *Physical Phenomena attending Solar Eclipses*; *Origin of the Forms and Present Condition of some of the Clusters of Stars*; and *Harmonies in the Arrangement of the Solar System*. He d. 1883.

ALEXANDER, WILLIAM, 1726-83; b. New York; a maj.-gen. in the revolution. He claimed the earldom of Stirling, and is generally known as lord Stirling. He was son of James Alexander, well educated and of high repute for scientific attainments. He was in England in 1755, and made an unsuccessful suit for the Stirling estates and titles; returned in 1761, and soon after married a daughter of Philip Livingston; succeeded his father as surveyor-gen., and was a member of the provincial council. He sided with the revolutionists and was made a col. in 1775, and brig.-gen. by congress in 1776. He was conspicuously brave in the battle of Long Island, where he was taken prisoner, after securing the retreat of most of his command; but he was soon exchanged, and made a maj.-gen. in Feb., 1777, and distinguished himself at Brandywine and Germantown. At Monmouth he led the left wing, and did much to secure the victory. He was commander at Albany in 1781. He was prominent in founding King's college (now Columbia University) and the Society Library of New York city.

ALEXANDER, Sir WILLIAM, Earl of Stirling, 1580-1640; a poet of an eminent Scotch family. He was educated at Glasgow university; traveled on the continent; was tutor to the young earl of Argyre, and so found access to the court of James I. He wrote sonnets, the *Four Monarchicke Tragedies*, *Elegy on the Death of Prince Henry*, the *Day of the Lord's Judgment*, *An Encouragement to Colonies*, and many poems. In 1621, Sept. 21, he received the most prodigious gift ever bestowed on a subject, viz., a "gift and grant" of Canada, including Nova Scotia and Newfoundland; a singular instance of royal ignorance of geographical limits in America; still Charles I. confirmed the grant, but its further history must be sought in the romance of the peerage and of the law

courts. In 1626, A. was made secretary of state for Scotland, and in 1630 was created a peer as lord Alexander of Tullibody and viscount Stirling, and was made judge of the sessions in 1631. The next year he built the Argyle house, still one of the sights of Stirling. In 1633, he was made earl of Stirling and viscount of Canada, and in 1639 earl of Doon.

ALEXANDER, WILLIAM, D. D., LL. D., Anglican prelate; b. Londonderry, Ire., 1824. He graduated at Oxford; served a curacy in the n. of Ireland; was appointed dean of Emly, 1864, and bishop of Derry and Raphoe, 1867, and was elected primate of Ireland in 1896. He contributed frequently to periodical literature, has published *Leading Ideas of the Gospel*, *The Witness of the Psalms to Christ and Christianity*, 1877, etc. He married Miss Cecil Frances Humphries, author of *Poems on Old Testament Subjects*, etc.

ALEXANDER (ALEXIS, or ALEXIUS) I., COMNENUS, 1182-1222; a descendant of the great Comneni family, rulers of Constantinople. His father was killed, and his mother fled with him and his brother David to a relative, the Georgian queen of Tiflis, who raised and educated the children. On the second capture of Constantinople, 1204, A. and his brother led some disaffected Greeks to the capture of Trebizond and the neighboring Black sea coast, while David took Sinope, and threatened Constantinople. A. became ruler of all Anatolia, but was in perpetual war with the Turks and the petty emperor of Nicæa. When he died his empire was a mere strip along the Black sea, between the Phasis and the Thermodon.

ALEXANDER JANNÆUS, third son of John Hyrcanus and first prince of the Maccabees who for any considerable period enjoyed the title of king (from 104 to 78 B.C.). He was warlike and enterprising, but was badly defeated in Galilee by Ptolemy, the son of Cleopatra of Egypt. A. then made an alliance with Cleopatra, and after some defeats captured several towns on the Mediterranean, the last being Gaza, which he reduced to utter ruin, B.C. 96. He was next called to Jerusalem to put down an insurrection, which he did after sacrificing 6000 lives, and soon after sacrificed 5000 more in a second insurrection. In still another rebellion A. was victorious, when he made a great entertainment for his friends, at which, as a part of the enjoyment, he had 800 rebels crucified in his presence, and their wives and children butchered before their eyes before they expired.

ALEXANDER NEWSKI, or NEVSKI, a Russian hero and saint, b. at Vladimir in 1219 A.D., was the son of the grand duke Jaroslav, of Novgorod. In order to defend the empire, which was attacked on all sides, but especially by the Mongols, his father quitted Novgorod, leaving the cares of the government to his sons, Fedor and Alexander, the former of whom died soon afterwards. The latter vigorously resisted the enemy; yet Russia was forced to submit to the Mongol dominion in 1238 A.D. A. now fought to defend the western frontier against the Danes, the Swedes, and the Teutonic knights. He received the surname of Newski, on account of the splendid victory over the Swedes, which he achieved in 1240, on the Nawa (Neva), in the province where St. Petersburg now stands. In 1243 A.D., on the ice of lake Peipus, he defeated the Livonian knights of the sword, who had been stimulated by the pope to attack the Russian heretics. At the death of his father in 1247, he became grand duke of Vladimir. Pope Innocent IV. now made a diplomatic attempt to reunite the Greek and Roman churches, since his military scheme had failed, and with this view sent an embassy to A., which, however, proved as ineffectual as the former. To the end of his life, however, he remained a vassal of the Tartars or Mongols. Thrice had he to renew his oath of fealty to the Asiatic barbarians, making in each instance a journey to their camp. He died in 1263 A.D., at Kassimcow, on his return from the last of these journeys; and the gratitude of the nation perpetuated his memory in popular songs, and even canonized him. Peter the Great honored his memory by building a magnificent convent on the spot where A. had fought his great battle, and by founding the knightly order of A. N.

ALEXANDER OF APHRODISIAS, lived in the 2d and 3d c., A.D.; the most celebrated of Greek commentators on Aristotle, and styled "the expositor." He was a native of Aphrodisias, and taught peripatetic philosophy at Athens. His commentaries, many of which are extant, were especially esteemed by the Arabs. He also wrote original works, of which the most important is *On Fate*, in which he argues against the Stoic doctrine of necessity; and one *On Soul*, in which he holds that the undeveloped reason in man is material and inseparable from the body. He identified the active intellect with God.

ALEXANDER OF HALES (in Latin, Alexander Halensis), a famous theologian, known as the "irrefragable doctor;" d. 1245. He was originally an ecclesiastic in Gloucestershire, but had attended the schools of Paris, got the degree of doctor, and had become a noted professor of philosophy and theology there, when (1222) he suddenly entered the order of the Minorite friars. From that time, he lived the life of a studious recluse. His chief and only authentic work is the *Summa Universa Theologia* (best ed., Venice, 1576, 4 vols.), written at the command of pope Innocent IV., and enjoined by his successor, Alexander IV., to be used by all professors and students of theology in Christendom. A. gave the doctrines of the church a more rigorously syllogistic form than they had previously had, and may thus be considered as the author of the scholastic theology. Instead of appealing to tradition and authority, he deduces with great subtlety, from assumed premises, the most startling doctrines of Catholicism, especially in favor of the prerogatives of the papacy. He refuses any toleration to heretics, and would have them

deprived of all property; he absolves subjects from all obligation to obey a prince that is not obedient to the church. The spiritual power, which blesses and consecrates kings, is, by that very fact, above all temporal powers, to say nothing of the essential dignity of its nature. It has the right to appoint and to judge these powers, while the pope has no judge but God. In ecclesiastical affairs, also, he maintains the pope's authority to be full, absolute, and superior to all laws and customs. The points on which A. exercises his dialectics are sometimes simply ludicrous; as when he discusses the question whether a mouse that should nibble a consecrated wafer would thereby eat the body of Christ.

ALEXANDER (JOSEPH) I., former Prince of Bulgaria, the second son of Prince Alexander of Battenberg (Hesse) by a morganatic marriage with Countess von Kauck, was born in 1857; served with the Prussian army during the war with Turkey; and subsequently did garrison duty at Potsdam as a member of the Prussian Life Guards. He was elected hereditary prince of Bulgaria by the Assembly of Notables in 1879, and in 1881 was invested with extraordinary legislative powers for seven years by a vote of the Grand National Assembly. His decision on the revolution of Philippopolis, led to a declaration of war by Serbia, but Alexander conducted the campaign most brilliantly, and King Milan was obliged to sign a treaty of peace. By consenting to the union of the two Bulgarias, Alexander incurred the jealousy of his cousin, the Czar, Alexander III., who removed him from the army. Finally, Aug. 20, 1886, part of his army, through Russian intrigue, revolted, and compelled him to sign his abdication, and he was then carried a prisoner into Russian territory. Popular indignation in Bulgaria procured his release, but he soon formally abdicated. His engagement to the Princess Victoria of Germany being opposed by Bismarck was broken off, and in 1889 he married Fräulein Amalia Loisinger, an actress, and retired to his estate at Gratz. Died 1893.

ALEXANDER I., PAULOWITSCH, Emperor and autocrat of all the Russias (1801-25), was b. Dec. 23, 1777. His education, in which his father, Paul I., had no hand, was conducted by his grandmother, Catharine II., and Col. Laharpe and other tutors. He always showed great affection for his mother, Maria, daughter of Eugene, duke of Württemberg. With a humane and benevolent disposition, the "northern Telemaque" was imbued by Laharpe with the enlightened principles of the age. Prof. Kraft instructed him in experimental physics, and Pallas in botany. It was thought better not to devote his attention to poetry and music, as it would have required too much time to make any great acquirements. In 1793 he married Elizabeth, daughter of Karl Ludwig, crown prince of Baden, and on the assassination of his father Paul (q. v.), on the 24th of March, 1801, succeeded him upon the throne. Although A. doubtless knew of the conspiracy to dethrone his father, there is no reason to believe that he contemplated the crime of murder. His accession was celebrated by Klopstock in an ode, *To Humanity*, indicative of the high expectations formed of him. The young ruler seemed deeply penetrated with a sense of his obligation to make his people happy and to promote their civilization and prosperity. He was the first to lay the foundation of the national culture and popular instruction on a regular plan, to introduce organization into the internal administration, and unshackle the industry of the nation.

Of specific internal improvements effected by A., his exertions on behalf of the language, literature, and general culture of the Slavonic nations deserve special notice. Seven universities, at Dorpat, Kasan, Charkow, Moscow, Wilna, Warsaw, and St. Petersburg, were either instituted or remodeled by him; 204 gymnasiums and normal schools, and above 2000 district elementary schools, were erected; and fresh life and activity given to the higher scientific institutions in St. Petersburg and Moscow. He did more than any other sovereign in Europe for the spread of the Bible, by supporting the Bible society (which was suppressed, however, in 1826); and in 1820 he had a bishop instituted for the evangelical Lutheran church, and a general consistory in St. Petersburg for the whole empire. He devoted large sums to the printing of important works, such as Krusenstern's *Travels* and Karamsin's *History of Russia*, and prized and rewarded scientific merit both at home and abroad. Several scientific collections were purchased by him, and in 1818 he invited two orientalists, Demange and Charmoy, from Paris to St. Petersburg, to promote the study of the Arabic, Armenian, Persian, and Turkish languages. Young men of talent were sent to travel at his expense. By the ukase of 1816 he prepared the way for the abolition of slavery in the Baltic provinces; he also declared that no more gifts of peasants would be made on the crown-lands. As early as 1801 he had abolished the secret tribunal which is said to have extorted confession from political offenders by means of hunger and thirst. The practice of slitting the nose and branding, which had been customary in connection with knouting, was also done away with. Laws were enacted to prevent the abuses of power by governors. The privilege of the nobles, that their inherited property could not be confiscated as a punishment, was raised by him to a common right for all subjects; and much was done in composing a code of civil law. He promoted the manufactures and trade of the empire by amending the laws regarding debt and mortgages, and by the institution of an imperial bank, the construction of roads and canals, making Odessa a free port, and, above all, by the ukase of 1818, permitting all peasants in the empire to carry on manufactures.

A.'s far-sighted policy with regard to the foreign commerce of Russia is shown in various expeditions round the world sent out by him; in the embassy to Persia in 1817, in which was the Frenchman Gradanne, who was acquainted with all the plans of Napoleon respecting India and Persia; in the missions to Cochinchina and to Kiwa:

in the treaties with the United States, Brazil, and Spain; in the naval and commercial treaties with the Porte; and in the settlement on the n.w. coast of America.

A.'s foreign policy was characterized at the outset by a desire for peace; in 1801 he concluded a convention putting an end to hostilities with England, and made peace with France and Spain. He next entered, along with France, into negotiations respecting the indemnification of the minor states in Germany and Italy, but soon discovered how little the French ruler intended any real compensation. As Bonaparte encroached more and more, took possession of Hanover, and annihilated Holland, A. broke with France, and joined the coalition of 1805. He was present at the battle of Austerlitz, when the allied armies of Austria and Russia were defeated, and retired with the remains of his forces into Russia, declining to enter into the treaty that followed. Next year he came forward as the ally of Prussia; but after the disastrous battles of Eylau and Friedland, in 1807, he was obliged to conclude the peace of Tilsit, in which he managed to prevent the restoration of the kingdom of Poland, and to mitigate the hard fate of the king of Prussia. During the war with France, A. had also to carry on hostilities with Persia and with Turkey.

Dazzled by the fortune and genius of Napoleon, A., in pursuance of the stipulations of Tilsit, acceded with his huge empire to the French continental system, thus altering entirely the foreign policy of Russia. He began by declaring war on England in 1808, and attacking her ally Sweden, wrested from that country, by the peace of Friedrichshamm (1809), the province of Finland. On the other hand, the Russian fleet, sent to the aid of the French at Lisbon, fell into the hands of the British. In the autumn of 1808, the two great potentates held a meeting at Erfurt, attended with great splendor, at which A. represented, as it were, the empire of the east of Europe, while Napoleon assumed the dominion of the west. In the war of France against Austria in 1809, A. took only a lukewarm part, although at the peace of Vienna he received the circle of Tarnopol as his share of the spoil of Galicia. Against the Porte, which had not observed the armistice of Slobosta, he renewed the war, which was continued till the peace of Bucharest in 1812.

The alliance, however, of A. with the Corsican conqueror involved such an inconsistency, and was so contrary to the real interests of Russia, that a rupture and a complete change of the Russian policy were inevitable. The pressure of the continental system on the material resources of Russia, the despotic changes made by Napoleon, the augmentation of the duchy of Warsaw, the proffers of alliance by England and Sweden, awoke in A. first discontent and aversion, and soon the thought of a decisive contest against the subjugator of Europe and the disturber of the peace of the world. When this gigantic struggle at last began (1812), Russia brought into the field an army of nearly 900,000 men. During this war (see RUSSO-GERMAN WAR), A. repeatedly exposed himself to personal danger, in order to fire the courage and patriotism of his troops. His magnanimity toward France after the taking of Paris facilitated the negotiations for peace, and won for him great personal regard, amounting to a kind of enthusiasm. He was received with the same feeling in London, which he visited after the treaty of Paris in June, 1814. When he returned to St. Petersburg, his first care was to provide for the wounded, and for the families of the soldiers that had fallen. The senate wished to give him the title of "blessed," which, from Christian humility, he declined. After a short residence in his own capital, he repaired to the congress of Vienna. Here he laid claim to Poland as essential to the interests of Russia, but promised to confer on it a constitution, and, on the whole, appeared to act for the good of humanity and the freedom of nations.

In the return of Napoleon, A. saw the confusion of Europe begun again, and therefore urged the fulfillment of the treaty of Chaumont and the outlawry of the common enemy. His appearance in the French capital after the battle of Waterloo raised less enthusiasm than previously; yet on this occasion, too, France owed much to his generosity. It was about this time that the tendency of A. to pietism fostered by intercourse with Madame Krüdener (q.v.), was most strongly manifested, and exercised decided influence on his political views. It was under the influence of this religiosity that he founded the holy alliance (q.v.), the ostensible object of which was to make the principles of Christianity be recognized in the political arrangements of the world, but which became, in fact, a mere handle for political reaction.

In the end of Oct., 1815, A. returned to his own dominions. His policy, and the march of events, had completely changed the internal condition of Russia and her foreign relations. Her weight in European politics had become powerful; the limits of the empire had extended in all directions; and notwithstanding the war, the earlier legislative reforms had begun to act favorably on the industry and well-being of the nation. After 1805, A. had remodeled the army after the fashion of the western powers, and raised it to a condition that menaced Europe. When peace was attained, he not only sought to heal the wounds inflicted by the war, but to carry forward the work of reform formerly begun. Numerous administrative abuses were done away with, and the condition of the peasants was more and more alleviated. In 1816, the Jesuits, who were causing a great deal of disturbance, were made to leave St. Petersburg and Moscow, and in 1820 were sent out of the empire. On the other hand, proselytism was rigidly prohibited, and the Duchoborzes, a sect of the Russo-Greek church, were allowed the free exercise of worship.

But however good A.'s intentions might be, his internal policy met with obstructions, partly arising from his personal views and character, partly from the nature of his position. Affected with a morbid religiosity, worn out and shaken perhaps in body and mind by the vast events in the vortex of which he had moved for the last ten years, the emperor became possessed of a dread of another European revolution; and the political struggles against reaction in Germany, and the outbreaks against despotism in Italy and Spain, appeared to him as the beginning of a new and terrible catastrophe. The attention now bestowed by A. on foreign relations threw internal improvements into the background; and the liberal reformer and pupil of Laharpe found himself involved in hopeless inconsistency, when he fully concurred in the policy of the Austrian cabinet, and, at the congresses of Troppau, Laybach, and Verona, helped to crush, along with the insurrections, the just requirements and political progress of the nations.

This complete reversal of policy could not fail to produce fruits, especially as Russia peculiarly abounded in fermentable materials. Poland saw itself completely disappointed in its national expectations, and required the actual carrying out of the promised constitution. The contact into which the Russians had come during the war with the civilization and institutions of the western nations, had excited in different classes of Russian society wishes and views by no means compatible with their condition at home. On the other hand, there had long existed in the most influential circles an Old-Russian party, who either found their interests hurt by the enlightened measures of the emperor, or saw in them the downfall of the national church, and of the nation itself. Besides, the army was kept up on the war-footing, and in 1821 numbered about 830,000 regular troops; and this pressed severely on the people, and produced discontent, along with exhaustion and disorder of the finances. To meet this evil, A. began the planting of military colonies, which, however, met with insuperable obstacles in the execution, and did not attain the end in view. But to exorcise the spirit of political discontent and the phantom of a Russian revolution, the emperor adopted the same measures that were very generally applied over the rest of Europe with similar views. The censorship of the press, and a rigid guard over the importation of books, were again introduced; restrictions were put on science, literature, and education; inquiries instituted into all democratic movements; mason-lodges and missionary societies suppressed; and gradually all plans for reform and progress given up. Over all the provinces of the empire, a net of police, open and secret, was spread, which interfered with the ordinary intercourse of society.

The experience that, in spite of this system of repression, public opinion could not be stifled, and that parties and individuals only expressed themselves more bitterly; the variance with his former self in which A. found himself involved; and the difficulties of governing the huge empire, which were now becoming more manifest and startling—all this tormented and embittered his morbid mind, and led him to complain of ingratitude and of a want of recognition of his good intentions. Sometimes he sought to forget his position in the dissipations of a splendid court, in which luxury and piety were strangely blended; at other times, he plunged into the darkness of religious mysticism. The progress of the revolt in Greece brought the policy of the emperor into complete opposition to public opinion and the most sacred sympathies of the nation. The Russian people, restrained from all participation in political movements, were profoundly affected by the religious element of the Greek struggle; but the emperor condemned the rising as insurrection, disclaimed the favor he had formerly shown to the Greek cause, and confined himself to exhortations to the Porte to act with humanity. The death of his only and much-loved natural daughter, the terrible inundation suffered by St. Petersburg in 1824, in which he exposed himself to personal danger, and the alarm caused by a Russo-Polish conspiracy against all the members of the house of Romanow, contributed not a little to break the heart of the emperor, and completely destroy the composure of his mind. Sick in body, weary of life, and possessed by thoughts of death, he commenced, in Sept., 1825, a journey to the Crimea, with a view to benefit the health of the empress, who was ailing, and that he himself might enjoy retirement. Leaving the empress at Taganrog, he continued his journey, but was suddenly seized by a fever peculiar to the country, and obliged to return to Taganrog. Here, in spite of all care, he became worse, and died, Dec. 1, 1825. The rumor that he had been poisoned is altogether groundless. He is said to have learned, shortly before his death, the details of the conspiracy which his brother and successor, Nicholas I. (q.v.), had to begin his reign by putting down.—See Choiseul-Gouffier's *Mémoires Historiques sur l'Empereur Alexandre et la Cour de Russie*, Paris, 1829; and *Alexander I.: His Life and Times*, by C. Joyneville, London, 1875.

ALEXANDER II., Emperor of Russia, was b. April 29, 1818. He was carefully educated by his father, Nicholas, who professed himself delighted with the manifestations of "true Russian spirit" in his son. At 16, he was declared of age, made commandant of the lancers of the guard, hetman of the Cossacks, first aide-de-camp of the emperor, and subjected daily to a life of manœuvring, reviewing, and military parade, which at last seriously injured his health. He then traveled through Germany to recruit his energies, and while there, concluded a marriage with the Princess Maria, daughter of the grand duke of Darmstadt, in 1841. He now vigorously applied himself to his duties as chancellor of the university of Finland. By his dexterous and subtle manners, he

insinuated himself into the affections of the Finns, and weakened their love of independence. He founded a chair of the Finnish language and literature, and defrayed the expenses of remote explorations undertaken by their *savans*, such as Cygnæus, Wallin, and Castren. In 1850, he visited southern Russia, Nicolaïeff, Sebastopol, Tiflis, Erivan, etc. It is said that he witnessed with regret the attitude which his father assumed towards Europe, and that he altogether disapproved of the Crimean war. On his accession to the throne, Mar. 2, 1855, he found himself in a very critical position. He had two parties to conciliate at home—the old Muscovite party, blindly zealous for war, and the more peaceable and intelligent portion of the nation, who possessed his personal sympathies. He pursued a course calculated to encourage both; spoke of adhering to the policy of his “illustrious ancestors,” and at the same time concluded peace. He subsequently showed a strong desire to purge the internal administration of its impurities; he sharply rebuked the corruption of functionaries, and severely punished some, as a warning to the rest. An honorable recognition was ever given to public instruction, which he placed under his own superintendence. By a ukase of May 27, 1856, he granted to all Polish exiles, who were willing to express repentance for the past, permission to return home; but though desirous of preserving the nationality of Poland, he would not have it separated from the “great Russian family.” The grand achievement of his reign, however, was the emancipation of the serfs—23,000,000, souls—by a ukase of Mar. 3, 1861. This marked an epoch in the national history. In 1865, A. established elective representative assemblies in the provinces. He carried on wars against Bokhara in 1866; Khiva, in 1873; and Khokan, in 1875–76. The czar took the field with the army in the war with Turkey, 1877–78. In 1880, the Emperor dissolved the hated secret police, a concession to the revolutionists, who had thrice attempted to assassinate him, but on Mar. 13, 1881, while returning in his sleigh from a parade in St. Petersburg he was killed by a dynamite bomb.

ALEXANDER III. (Alexandrovitch) EMPEROR OF ALL THE RUSSIAS, was born Mar. 10, 1845, and during his father's lifetime served as aide-de-camp and general in the suite of the emperor, etc. He succeeded his father, who was assassinated by Nihilists, Mar. 13, 1881, but through fear of a like fate shut himself in his palace at Gatchina, and his coronation was postponed until 1883, took place at Moscow, May 27, and was celebrated with elaborate ceremonies and with national festivities. His policy, like that of his father, has been to repress Nihilism; to extend the Russian frontier in Asia and Europe; to organize the Asiatic and Caucasian provinces, and to counteract the influence of Austria in the Balkhan peninsula. His jealousy of his cousin, Alexander I. of Bulgaria (q.v.), led to the latter's forced abdication, and his hatred of the Jews was shown in 1891 by the expulsion from Russia of thousands. Several attempts to assassinate the emperor were made in 1887 and in 1888 he and his family barely escaped death by a railway accident. He married, Nov. 9, 1866, Mary Sophia Frederica Dagmar (Mary-Féodorovna) daughter of Christian IX. of Denmark, and has three sons (Nicholas, heir-apparent, b. 1868) and two daughters. Alexander's reign was memorable for the relentless severity of the measures directed against the Nihilists (q.v.), and for a certain reactionary (old Russian) tendency in the policy of the government. Among the memorable incidents of the reign will be remembered the overtures by Russian influence of Prince Alexander of Bulgaria in 1885 (see BULGARIA); the persecution and expulsion of the Jews in 1890–91, and the apparent military rapprochement between Russia and France in 1891. See TRIPLE ALLIANCE. He died Nov. 1, 1894, and was succeeded by his son, Nicholas II.

ALEXANDER I., King of Scotland, a younger son of Malcolm Ceanmhor (big-head), succeeded his brother, Edgar, in 1107, and amidst incessant disturbances, governed Scotland for 17 years with great ability. In addition to good natural powers, he had enjoyed, through his mother, Margaret of England, the advantages of a higher mental cultivation than any of his predecessors. One of the most formidable insurrections which his prompt energy enabled him to quell was that excited in 1120 by Angus, great-grandson of the wife of Macbeth. His determined resistance to the pretensions of the English hierarchy secured the independence of the Scottish church, while his liberal patronage of the monasteries promoted her strength at home. In 1123 he founded the abbey of Inchcolm. He died at Stirling in 1124.

ALEXANDER II. was b. in 1198; succeeded his father, William the Lion, in 1214. He early displayed that wisdom and strength of character, in virtue of which he holds so high a place in history among Scottish kings. The first act of his reign was to enter into a league with the English barons who had combined to resist the tyranny of king John. This drew down upon him and his kingdom the papal excommunication; but two years subsequently (1218), the ban was removed, and the liberties of the Scottish church were even confirmed. On the accession of Henry III. to the English throne, A. brought the feuds of the two nations to a temporary close by a treaty of peace (1217), in accordance with which he married Henry's eldest sister, the princess Joan (1221). The alliance thus established was broken after the death, without issue, of queen Joan (1238), and the second marriage of A. with the daughter of a nobleman of France. In 1244, Henry marched against Scotland, to compel A.'s homage. In this emergency, the Scottish king received the steady support of the barons, whose ordinary policy was opposition to the crown, and is said, in a short time, to have found himself at the head of 100,000

foot, and 1000 horse. A peace was concluded without an appeal to arms. While engaged in one of those warlike expeditions which the turbulence of his subjects so frequently rendered necessary, A. died of fever at Kerrera, a small island opposite Oban, on the w. coast of Argyleshire, in the 35th year of his reign, 1249.

ALEXANDER III., 1241-86, succeeded his father, A. II., on the Scottish throne in 1249, and, two years later, in 1251, he married the princess Margaret, eldest daughter of Henry III. of England. The tender age of the sovereign enabled Henry to prosecute successfully for some time his schemes for obtaining entire control over the Scottish kingdom; but long before he reached manhood, A. displayed so much energy and wisdom as to give assurance that when the administration of affairs should come under his personal direction, it would be vain to think of reducing him to submission. Very shortly after he had come of age, his energies were summoned to the defense of his kingdom against the formidable invasion of Haco, king of Norway (1263), who claimed the sovereignty of the western isles. In attempting a landing at Largs, on the coast of Ayr, the Norwegian prince sustained a total defeat; and A., as the result of this important victory, secured the allegiance both of the Hebrides and of the Isle of Man. The alliance between Scotland and Norway was strengthened in 1282 by the marriage of A.'s only daughter, Margaret, to Eric, king of Norway. This princess died in the following year, leaving an infant daughter, Margaret, commonly designated the Maiden of Norway, whose untimely death, on her way to take possession of her throne, was the occasion of so many calamities to Scotland. During the concluding years of A.'s reign, the kingdom enjoyed a peace and prosperity which it did not taste again for many generations. The justice, liberality, and wisdom of the king endeared his memory to his subjects, while the misfortunes that followed his death heightened the national sense of his loss. His only son, A., who had married the daughter of Guy, count of Flanders, died without issue in 1284. A. contracted a second marriage in 1285 with Joleta, daughter of the count de Dreux, but was soon after killed by falling from a precipice.

ALEXANDER VI. (BORGIA), 1431-1503, pope 1492-1503, the most celebrated of the eight popes of this name, and at the same time the most powerful one that ever lived, as well as the most noted prince of his age. His most conspicuous quality was severity, united with great fearlessness in danger, an unwearied perseverance and vigilance in all his undertakings, a soft and pleasing manner toward his inferiors, a bold and grasping spirit toward the rich. He was born at Valencia, in Spain, 1430. His own name was Rodrigo Lenzuoli, but he assumed the ancient and famous one of his mother's family, Borgia. A. was made a cardinal by his uncle Calixtus III., and on the death of Innocent VIII., was elevated to the papal chair, which he had previously secured by flagrant bribery. The long absence of the popes from Italy had weakened their authority and curtailed their revenues. To compensate for this loss, A. endeavored to break the power of the Italian princes, and to appropriate their possessions for the benefit of his own family. To gain this end he employed the most extreme means. He died in 1503, from having partaken, by accident, as is commonly asserted, of poisoned wine intended for his guests. Under his pontificate, the censorship of books was introduced.

ALEXANDER I., king of Servia, born in 1876, son of king Milan, on whose abdication in 1889 he was proclaimed king.

ALEXANDER SEVERUS, b. about 205, a Roman emperor (222-235 A. D.), the cousin-adopted son, and successor of Heliogabalus. The excellent education which he received from his mother, Julia Mammæa, rendered him one of the best princes in an age when virtue was reckoned more dangerous than vice in a monarch. He sought the society of the learned; Paulus and Ulpian were his counselors, Plato and Cicero were, next to Horace and Virgil, his favorite authors. Although a pagan, he revered the doctrines of Christianity, and often quoted that saying: "Whatsoever ye would that men should do to you, do ye even so to them." Beloved as he was by the citizens on account of his equity, he soon became an object of hatred to the unruly prætorian guards. His first expedition, against Artaxerxes, king of Persia, was happily terminated by a speedy overthrow of the enemy. But during one which he undertook against the Germans on the Rhine, to defend the frontiers of the empire from their incursions, an insurrection broke out among his troops, headed by Maximin, in which Alexander was murdered, along with his mother, not far from Mentz. The grateful people, however, placed him among the gods. After his death, military despotism obtained the ascendancy.

ALEXANDER THE GREAT, son of Philip of Macedon and Olympias, daughter of Neoptolemus of Epirus, was b. at Pella, 356 B. C. Endowed by nature with a happy genius, he early announced his great character. Philip's triumphs saddened him. On one occasion he exclaimed: "My father will leave nothing for me to do." His education was committed first to Leonidas, a maternal relation, then to Lysimachus, and afterwards to Aristotle. This great philosopher withdrew him to a distance from the court, and instructed him in every branch of human learning, especially in what relates to the art of government, while at the same time he disciplined and invigorated his body by gymnastic exercises. As Macedon was surrounded by dangerous neighbors, Aristotle was anxious to inspire his pupil with military ardor, and with this view recommended him to

study the *Iliad*, a revision of which he himself undertook for his use. A. was 16 years of age when his father marched against Byzantium, and left the government in his hands during his absence. Two years afterwards, he displayed singular courage at the battle of Charonea (338 B.C.), where he overthrew the sacred band of the Thebans. "My son," said Philip, as he embraced him after the conflict, "seek for thyself another kingdom, for that which I leave is too small for thee." The father and son quarreled, however, when the former repudiated Olympias. A. took part with his mother, and fled, to escape his father's vengeance, to Epirus; but receiving his pardon soon afterwards, he returned, and accompanied him in an expedition against the Triballi, when he saved his life on the field. Philip being appointed generalissimo of the Greeks, was preparing for a war with Persia, when he was assassinated (336 B.C.), and A., not yet 20 years of age, ascended the throne. After punishing his father's murderers, he went into the Peloponnesus, and in a general assembly of the Greeks he caused himself to be appointed to the command of the forces against Persia. On his return to Macedon, he found the Illyrians and Triballi up in arms, whereupon he marched against them, forced his way through Thrace, and was everywhere victorious. But now the Thebans had been induced, by a report of his death, to take up arms, and the Athenians, stimulated by the eloquence of Demosthenes, were preparing to join them. To prevent this coalition, A. rapidly marched against Thebes, which, refusing to surrender, was conquered and razed to the ground: 6000 of the inhabitants were slain, and 30,000 sold into slavery; the house and family of the poet Pindar alone being spared. This severity struck terror into all Greece. The Athenians were treated with more leniency, A. only requiring of them the banishment of Charidemus, who had been most bitter in his invectives against him.

A. having appointed Antipater his deputy in Europe, now prepared to prosecute the war with Persia. He crossed the Hellespont in the spring of 334 B.C., with 30,000 foot and 5000 horse, attacked the Persian satraps at the river Granicus, and gained a complete victory, overthrowing the son-in-law of Darius with his own lance. The only real resistance the Macedonians met with was from the Greek auxiliaries of the Persians, who were marshaled in phalanxes, under the command of Memnon of Rhodes, but finally they were all slain except 2000, who were taken prisoners. A. celebrated the obsequies of his fallen warriors in a splendid manner, and bestowed many privileges on their relations. Most of the cities of Asia Minor, Sardis not excepted, opened their gates to the conqueror, nor did Miletus or Halicarnassus offer longer resistance. A. restored democracy in all the Greek cities, cut the Gordian-knot (q.v.) with his sword as he passed through Gordium, and proceeded to the conquest of Lycia, Ionia, Caria, Pamphylia, and Cappadocia. His career was checked for a time by a dangerous illness, brought on by bathing in the Cydnus. On this occasion he displayed his magnanimity in the following circumstances. He received a letter from Parmenio, insinuating that Philip, his physician, intended to poison him, having been bribed by Darius. A. handed the letter to Philip, and at the same time swallowed the draught which had been prepared for him. As soon as he recovered, he advanced towards the defiles of Cilicia, in which Darius had stationed himself, with an army of above 500,000 men. He arrived in Nov., 333 B.C., in the neighborhood of Issus, where a battle took place, between the mountains and the sea. The disorderly masses of the Persians were thrown into confusion by the charge of the Macedonians, and fled in terror. On the left wing 30,000 Greeks, in the pay of the Persian king, held out longer, but they, too, were at length compelled to yield. All the treasures as well as the family of Darius fell into the hands of the conqueror, who treated the latter with the greatest magnanimity. The king, who fled towards the Euphrates, twice made overtures of peace, which A. haughtily refused, saying that Darius must regard him as the ruler of Asia, and the lord of all his people. One of the conditions of the second overture was that A. should possess all Asia to the Euphrates. On hearing which, his general, Parmenio, exclaimed: "I would do it, if I were A." "So would I," replied the monarch, "if I were Parmenio." The victory at Issus opened the whole country to the Macedonians. A. now turned towards Syria and Phœnicia, to cut off Darius's escape by sea. He occupied Damascus, where he found princely treasures, and secured to himself all the cities along the shores of the Mediterranean. Tyre, confident in its strong position, resisted him, but was conquered and destroyed, after seven months of incredible exertion (332 B.C.). Thence he marched victoriously through Palestine, where all the cities submitted to him except Gaza, which shared the same fate as Tyre. Egypt, weary of the Persian yoke, welcomed him as a deliverer; and in order to strengthen his dominion here, he restored all the old customs and religious institutions of the country, and founded Alexandria in the beginning of 331 B.C., which became one of the first cities of ancient times. Thence he marched through the Libyan desert, in order to consult the oracle of Jupiter Ammon, whose priest saluted him as a son of Jove; and at the return of spring went against Darius, who had assembled an army in Assyria. A battle ensued, in Oct., 331 B.C., on the plains of Arbela, or rather Guagamela—for Arbela, the point to which A. pursued the Persians, is 50 m. from the scene of the fight. See ARBELA. Notwithstanding the immense superiority of his adversary, who had collected a new army of 500,000 men, A. was not for a moment doubtful of victory. Heading the cavalry himself, he rushed on the Persians, and put them to flight; but as soon as he had entirely dispersed them, he hastened to the assistance of his left wing, which, in the mean while, had been sorely pressed. He was anxious to make a prisoner of the Persian king him-

self, but the latter escaped by flight on horseback, leaving his baggage and all his treasures a prey to the conqueror. Babylon and Susa, the storehouses of the treasures of the east, opened their gates to the conqueror, who next marched towards Persepolis, the capital of Persia, which he entered in triumph.

The marvelous successes of A. now began to dazzle his own judgment, and to inflame his passions. He became a slave to debauchery, and his caprices were as cruel as they were ungrateful. In a fit of drunkenness, and at the instigation of Thais, an Athenian courtesan, he set fire to Persepolis, the wonder of the world, and reduced it to a heap of ashes; then, ashamed of the deed, he set out with his cavalry to pursue Darius. Learning that Bessus, the satrap of Bactriana, held the king a prisoner, he hastened his march, in the hope of saving him, but he found him mortally wounded on the frontiers of that country (330 B.C.). He mourned over his unfortunate enemy, and caused his body to be buried with all the usual rites observed in Persia; but he pursued Bessus, who himself aspired to the throne, through Hyrcania, Iran, Bactriana, over the Oxus to Sogdiana (now Bokhara), whose satrap, Spitamenes, surrendered Bessus to him. Having discovered a conspiracy in which the son of Parmenio was implicated, he put both father and son to death, though Parmenio himself was innocent of all knowledge of the affair. This cruel injustice excited universal displeasure. In 329 he penetrated to the furthest known limits of northern Asia, and overthrew the Scythians on the banks of the Jaxartes. In the following year, he subdued the whole of Sogdiana, and married Roxana, whom he had taken prisoner. She was the daughter of Oxyartes, one of the enemy's captains, and was said to be the handsomest of the virgins of Asia. A new conspiracy broke out against A., at the head of which were Hermolaus and Callisthenes, a pupil of Aristotle, which occasioned the death of many of the culprits; while Callisthenes himself was mutilated, and carried about in an iron cage through the army, till some one put an end to his sufferings by poison.

In the year 327 B.C., A. proceeded to the conquest of India, then known only by name. He crossed the Indus near to the modern Attock, and pursued his way under the guidance of a native prince to the Hydaspes (modern Jelum), where he was opposed by Porus, another native prince, whom he overthrew after a bloody contest. Thence he marched as lord of the country through that part of India which is now called the Punjab, establishing Greek colonies. He then wished to advance to the Ganges, but the general murmuring of his troops obliged him, at the Hyphasis (modern Sutledge), to commence his retreat, which was accomplished under circumstances of extreme danger. When he had again reached the Hydaspes, he built a fleet, and sent one division of his army in it down the river, while the other followed along the banks, fighting its way through successive Indian armies. At length, having reached the ocean, he ordered Nearchus, the commander of the fleet, to sail thence to the Persian gulf, while he himself struck inland with one division of his army, in order to return home through Gedrosia (now Beloochistan). Here he had to traverse immense deserts, where a great part of his army perished for want of food and water, and were buried in the sand. The other division marched through Arachosia and Drangiana (Afghanistan) under Craterus, but they united again in Carmania. Of all the troops, however, which had set out with A., only about a fourth part arrived with him in Persia (325 B.C.). At Susa he married Stateira, the daughter of Darius, and he bestowed presents on those Macedonians (about 10,000 in number) who had married Persian women, his design being to unite the two nations as closely as possible. He also distributed liberal rewards among his soldiers. At Opis on the Tigris he declared it to be his intention to send home the invalids richly rewarded; and this he accomplished, but not till he had with some difficulty repressed the mutiny which broke out on the occasion. Soon afterwards he was deprived, by death, of his favorite Hephestion, on which occasion his grief was unbounded, and he interred the deceased with kingly honors. As he was returning from Ecbatana to Babylon, it is said that the Magi foretold that the latter city would prove fatal to him; but A. despised their warnings, and, in spite of the advice of his friends, marched to Babylon, before reaching which, however, he was met by ambassadors from all parts of the world—Libya, Italy, Carthage, Greece, the Scythians, Celts, and Iberians. Here he again occupied himself with gigantic plans for the future, both of conquest and civilization, when he was suddenly taken ill after a banquet, and died eleven days afterwards, on the 11th or 13th of May or June, 323 B.C., in the 32d year of his age, having reigned 12 years and 8 months. His body was deposited in a golden coffin at Alexandria, by Ptolemæus, and divine honors were paid to him, not only in Egypt, but in other countries. A. had appointed no heir to his immense dominions; but to the question of his friends: "Who should inherit them?" he replied: "The most worthy." After many disturbances, his generals recognized as kings the weak-minded Aridæus—a son of Philip by Philinna, the dancer—and A.'s posthumous son by Roxana, while they shared the provinces among themselves, under the name of satraps. Perdiccas, to whom A. had, on his death-bed, delivered his ring, became guardian of the kings during their minority.

It is but right to observe that A. did something more than shed blood during his life. He diffused the language and civilization of Greece wherever victory led him, and planted Greek kingdoms in Asia, which continued to exist for some centuries. At the very time of his death, he was engaged in devising plans for the drainage of the unhealthy marshes around Babylon, and a better irrigation of the extensive plains. It is

even supposed that the fever which he caught there, rather than his famous drink-ing-bout, was the real cause of his death. To A. the ancient world owed a vast increase of its knowledge in geography, natural history, etc. He taught Europeans the road to India, and gave them the first glimpses of that magnificence and splendor which has dazzled and captivated their imagination for 2000 years.

ALEXAN'DRA, CAROLINE MARIE CHARLOTTE LOUISE JULIE, b. Dec. 1, 1844; daughter of Christian IX, king of Denmark. She married, Mar. 10, 1863, Albert Edward, prince of Wales, eldest son of Victoria, queen of England, and heir to the British throne.

ALEXANDRETTA. See ALEPPO.

ALEXAN DRI, or ALEKSANDRI, VASILIO (Basil), a Rouman poet and *littérateur*, was b. at Jassy, the chief city of Moldavia, in 1821. His family was of Venetian origin. After spending several years at a French boarding-school at Jassy, he was sent, in his fourteenth year, with a tutor to Paris; and in due course he obtained from the university of Paris the degree of bachelor of letters. He is said to have thereafter made trial in succession of the study of medicine and the study of law, and to have found neither of them to his liking; he certainly followed up neither, but, without qualifying himself for any profession, went back to Jassy in 1839. He found at Jassy a band of young men educated, as he himself had been, in France, whose minds had been formed upon the literature and the political ideas of France; who, besides being ambitious of literary distinction, were zealous for political equality and for Rouman nationality and independence. He naturally became the associate of these men; and, soon after his return, made his *début* in literature by contributing a story, *The Flower-Girl of Florence*, to a periodical conducted by them under the editorship of Cogalniceano. He became a frequent contributor to this periodical. Unfortunately, it was not destined to live long, being suppressed by order of prince Stourdza. It was in 1842, after a long excursion among the mountains of his native province, that he first made his appearance as a poet, publishing several pieces, most of them strongly tinged with national feeling. At this time, too, it was that he began to write the songs and ballads upon which his chief claim to literary reputation at present rests. In 1844 he suddenly attained to an almost unbounded local popularity as a play-writer. Having become concerned in the management of two theaters at Jassy, the one French, the other Moldavian, he produced a series of pieces, some in French, others in Rouman, which, though mostly slight and hasty performances, had merit enough to excite the enthusiasm of his countrymen. *Georges de Sadagoura*, *Jassy en Carnaval*, *La Pierre de la Maison*, *La Noce Villageoise*, are the titles of the most important of them. In 1844, he had also, in conjunction with Cogalniceano and prince John Ghika, set on foot a new periodical, devoted to literature and science; but this, like the one already mentioned, was not suffered to live long—it was suppressed by the government, after a career of only nine months.

A. was engaged in the revolutionary movement which took place at Jassy in the year of revolutions, 1848, and on its failure had to betake himself to Paris. There, through the press, during the short period of his exile, he labored to arouse public opinion in favor of the independence of the Roumans; and his efforts, though they were unsuccessful at the time, helped, with those of others, to prepare the way for what took place several years after. It was to the Russian war that Moldavia and Walachia were destined to owe their virtual emancipation from the yoke of Turkey, and the chance of obtaining self-government and union. The union of the two principalities was carried by the resolution of their inhabitants, backed by the support of France, in spite of political obstacles that seemed almost insurmountable; and A. did not a little to inspire the resolution of his countrymen. A song which he wrote at the critical moment in 1856, *The Hour of Union*, became exceedingly popular, and by its stirring appeals to the feeling of Roumanian nationality, helped to allay the jealousies which divided the two principalities, and to make them work together for the union. A. took a prominent part in all the political transactions which culminated in this result. It should be stated that two years earlier, when the death of his father had put him into possession of the family estate, he had emancipated the serfs who lived upon it; and that this example found so many imitators that the government found itself almost immediately compelled to decree a general measure of enfranchisement.

A.'s *Popular Ballads of Roumania*, which he had begun to compose in 1842, appeared at Jassy in two parts in 1852 and 1853. One of the parts, translated into French by himself, was afterwards published at Paris under the title of *Ballades et Chantes Populaires de la Roumanie*. His collected dramatic works were published at Jassy in 1852. Another volume of poems appeared at Paris in 1853; and of this volume a French translation, with the title, *Les Doïnas Poésies Moldaves*, was soon afterwards produced by M. Vansco. *Le Collier Littéraire*, a miscellaneous collection of pieces in prose and verse, many of which had previously appeared in periodicals, he published in 1857. A., as may be inferred from facts already stated, wrote largely in periodicals, but mostly on subjects of passing interest. He died in 1890.

ALEXAN'DRIA, a co. in n. e. Virginia, on the Potomac, opposite the district of Columbia, and a part of that district until the recession in 1846; 32 sq. m.; pop. '90, 18,597.

inclu. colored. The surface is hilly and the soil thin. The chief productions are corn, wheat, oats, and hay. Co. seat, Alexandria.

ALEXANDRIA (called Skanderi'eh by the Turks and Arabs) was founded by Alexander the great in the autumn of the year 332 B.C. It was situated originally on the low tract of land which separates the lake Mareotis from the Mediterranean, about 14 m. w. of the Canopic mouth of the Nile. Before the city, in the Mediterranean, lay the island of Pharos, upon the n.e. point of which stood the famous light-house (Pharos), and which was connected with the mainland by a mole, called, from its length, the heptastadium, or "seven furlong" mole, thus forming the two harbors. The plan of A. was designed by the architect Dinocrates, and its original extent is said to have been about 4 m. in length, with a circumference of 15 m. It was intersected by two straight main streets, crossing each other at right angles in the middle of the city. Colonnades adorned the whole length of these streets, which were in general very regularly built. The most magnificent quarter of the city was that called the Bruchesium, which was situated on the eastern harbor. This quarter of the city contained the palaces of the Ptolemies, with the museum and the old library; the soma or mausoleum of Alexander the great and of the Ptolemies, the poseidonum, and the great theater. Further w. was the emporium or exchange. The Serapeion, or temple of Serapis, stood in the western division of the city, which formed the Egyptian quarter, and was called Rhacōtis; a small town of that name had occupied the site before the foundation of A. To the w. of the city lay the great necropolis, and to the e. the race-course, beyond which was the suburb of Nicopolis. The greater part of the space under the houses was occupied by vaulted subterranean cisterns, which were capable of containing a sufficient quantity of water to supply the whole population of the city for a year. From the time of its foundation, A. was the Greek capital of Egypt. Its pop. in the time of its prosperity is said by Diodorus to have amounted to about 300,000 free citizens, and if we take into account the slaves and strangers, that number must be more than doubled. This population consisted mostly of Greeks, Jews, and Egyptians, together with settlers from all nations of the known world. After the death of Alexander the Great, A. became the residence of the Ptolemies. They made it, next to Rome and Antioch, the most magnificent city of antiquity, as well as the chief seat of Grecian learning and literature, which spread thence over the greater part of the ancient world. The situation of the city, at the point of junction between the e. and w. rendered it the center of the commerce of the world, and raised it to the highest degree of prosperity.

A. had reached its greatest splendor when it came into possession of the Romans, about 30 B.C. From this moment its prosperity began to decline—at first almost imperceptibly, but afterwards more rapidly, in consequence of the removal of the works of art to Rome, the massacres of Caracalla, the laying waste of the Bruchesium by Aurelian, the siege and pillage of the city by Diocletian, and lastly the rising prosperity of the rival city of Constantinople. All these causes combined to destroy A. so speedily that in the 4th c. no building of any importance was left in it except the temple of Serapis. The strife between Christianity and heathenism gave rise to bloody contests in A. The Serapeion, the last seat of heathen theology and learning, was stormed by the Christians in 389 A.D., and converted into a Christian church. This put an end to heathenism, and A. became henceforward a chief seat of Christian theology, and continued to be so till it was taken by the Arabs, under Amru, in June, 638 A.D. This siege, and still more its conquest by the Turks in 868 A.D., completed the destruction of the city. It revived, indeed, in some degree under the Egyptian caliphs, and continued during the middle ages to be the most important emporium of trade between the east and west; but the discovery of America, and of the passage to India by the cape of Good Hope, very much diminished the trade of A.; and the dominion of the Mamelukes, and the conquest of Osmanli, annihilated even the little which the Arabs had restored. The result was that in 1778 A.D., A. contained no more than 6000 inhabitants. After the conquest of Egypt by the French in the end of the 18th c., A. once more began to revive; and under Mehemet Ali, who resided in it a part of every year, it prospered to such a degree that it may now be reckoned one of the most important commercial places on the Mediterranean. It is specially important as the center of steam-communication between Europe and India.

The present city is not situated exactly on the site of the old one, but is chiefly built on the mole called the heptastadium, which has been increased by alluvial deposits till it has become a broad neck of land between the two harbors, of which the eastern is called the new port, and the western the old port. A. is connected with Cairo by rail (continued to Suez) and by the canal of Mahmoudieh. Although originally, like other oriental cities, dirty and ill-built, it is improving. In 1882, the population was 208,755—Arabians, Turks, Jews, Copts, Greeks, and Franks. Of the few remains of antiquity still to be seen in A., the most prominent is Pompey's pillar, as it is erroneously called, the shaft of which, of red granite, is 73 ft. long. According to the Greek inscription on the base, which is still legible, this pillar was erected by the Egyptian prefect Publius, in honor of the emperor Diocletian. There were also the so-called Cleopatra's needles; two obelisks of the time of King Thotmes III., who lived in the 16th c. B.C. One of the needles, a monolith 72 feet high, was set up in New York in 1881; the other was

erected on the Thames embankment in 1878. The other antiquities of A. are some catacombs of the ancient city of the dead, and some of the cisterns below the city, which are almost entirely filled up. The chief modern public buildings are the khedive's palace, naval and military hospitals, a naval arsenal, custom house, bourse, two theatres, a naval school, and an Italian college. The Frank or European quarter, with its fine shops and hotels resembles a flourishing European city. Great destruction was caused by the bombardment by British ironclads in 1882. There are two ports, the old port or western having a breakwater mole and quays. Alexandria exports grain, cotton, dates, wool, gums, sugar, hides, etc. Pop. 210,000.

ALEXANDRIA, city and port of entry in Alexandria co., on the Potomac river, about 6 m. below Washington, on the opposite side of the river; lat. 38° 49' n., long. 77° 4' w. Though A. is fully 100 m. from the entrance of the Potomac into Chesapeake bay, yet the stream in front of it, which forms its harbor, is still a mile wide. The place is accessible, all the way from the sea, to the largest vessels. It is on the Chesapeake and Ohio, the Philadelphia, Wilmington and Baltimore, the Southern, and the Washington, Alexandria and Mount Vernon railroads. Owing to these admirable transportation facilities, Alexandria is able to control an extensive and increasing trade. It does a large coal and cotton business, and has several shoe factories, flour mills, machine shops and other industries. There are churches, national banks, public schools, academies, public library and newspapers. The city is lighted by gas and electricity. Pop. in '90, 14,339.

ALEXANDRIA, town in Jefferson co., N. Y., on the St. Lawrence river, 25 m. n.e. of Watertown; reached by steamer from Clayton, on the Rome, Watertown and Ogdensburg railroad. The Thousand Islands (numbering really more than a thousand) are a little below in the St. Lawrence, and are among the most beautiful and popular resorts in America. Many of these islands are occupied by private owners, who have elegant villas and cottages, and the whole series, not long ago almost unvisited, is a grand natural and artificial park. Pop. town, '90, 3300.

ALEXANDRIAN CODEX, an important manuscript of the sacred Scriptures in Greek, now in the British museum. It is written on parchment, in finely formed uncial letters, and is without accents, marks of aspiration, or spaces between the words. Its probable date is the latter half of the 6th century. With the exception of a few gaps, it contains the whole Bible in Greek (the Old Testament being in the translation of the Septuagint), along with the epistles of Clemens Romanus. For purposes of biblical criticism, the text of the epistles of the New Testament is the most valuable part, for with respect to the gospels, it is clear that the original text which the copyist had before him must have been far inferior. This celebrated manuscript belonged, as early as 1098, to the library of the patriarch of Alexandria. In 1628 it was sent as a present to Charles I. of England, by Cyrillus Lucaris, patriarch of Constantinople, who declared that he had got it from Egypt; and that it was written there appears from internal and external evidence. Græbe made this manuscript the foundation of his edition of the Septuagint (4 vols., Oxf. 1717-1720). Fac-similes have been published of the New Testament, by Woide (Lond. 1786), and by Cowper (Lond. 1860); of the Old Testament, by Baber (Lond. 1816).

ALEXANDRIAN LIBRARY. This remarkable collection of books, the largest of the ancient world, was founded by Ptolemy Soter, in the city of Alexandria, in Egypt. Even in the time of its first manager, Demetrius Phalereus, a banished Athenian, the number of volumes or rolls already amounted to 50,000; and during its most flourishing period, under the direction of Zenodotus, Aristarchus of Byzantium, Apollonius Rhodius and others, is said to have contained 400,000, or, according to another authority, 700,000. The greater part of this library, which embraced the collected literature of Rome, Greece, India, and Egypt, was contained in the museum, in the quarter of Alexandria called Brucheium. During the siege of Alexandria by Julius Cæsar, this part of the library was destroyed by fire; but it was afterwards replaced by the collection of Pergamos, which was presented to Queen Cleopatra by Mark Antony, to the great annoyance of the educated Romans. The other part of the library was kept in the Serapeion, the temple of Jupiter Serapis, where it remained till the time of Theodosius the Great. When this emperor permitted all the heathen temples in the Roman empire to be destroyed, the magnificent temple of Jupiter Serapis was not spared. A mob of fanatic Christians, led on by the Archbishop Theophilus, stormed and destroyed the temple, together, it is most likely, with the greater part of its literary treasures, in 391 A.D. It was at this time that the destruction of the library was begun, and not at the taking of Alexandria by the Arabians, under the caliph Omar. The story, at least, is ridiculously exaggerated which relates that the Arabs found a sufficient number of books remaining to heat the baths of the city for six months. The historian Orosius, who visited the place after the destruction of the temple by the Christians, relates that he then saw only the empty shelves of the library. See Petit-Radel, *Recherches sur les Bibliothèques Anciennes et Modernes* (Paris, 1819); and Ritschl, *Die Alexandrinischen Bibliotheken* (Berlin, 1838).

ALEXANDRINE AGE. After liberty and intellectual cultivation had declined in Greece, Alexandria in Egypt became the home and center of science and literature. The time in which it held this position is styled the A. A., and may be divided into two periods: the first including the reigns of the Ptolemies, from 323 to 30 B.C.; the second from 30 B.C. to 640 A.D., or from the fall of the Ptolemean dynasty to the irruption of the Arabs.

Ptolemæus Soter, the first ruler who introduced and patronized Greek science and literature in Alexandria, was followed by that yet more munificent patron, Ptolemæus Philadelphus, who regularly established the celebrated Alexandrian library and museum, which had been probably begun by his father. This museum contained porticos, a lecture-room, and a large hall, in which the learned men—the professors and fellows, as they might be called—dined together. The A. school consisted of Egyptians, Greeks, Jews, and latterly, Romans. The grammarians and poets made the greatest figure. The grammarians were both philologists and *littérateurs*, who explained things as well as words, and were thus a kind of encyclopædists. Among these rank Zenodotus of Ephesus, Eratosthenes of Cyrene, Aristophanes of Byzantium, Aristarchus of Samothrace, Crates of Mallus, Dionysius the Thracian, Apollonius the sophist, and Zoilus. Their chief service consists in having collected the writings then existing, prepared corrected texts, and preserved them for future generations. The most noted of the poets of the A. school were Apollonius Rhodius, Lycophron, Aratus, Nicander, Euphorion, Callimachus, Theocritus, Dionysius, and the seven tragedians called the A. Pleiades.

The A. school has a spirit and character altogether different from the previous intellectual life of Greece. From the attention paid to the study of language, it was natural that correctness, purity, and elegance of expression should become especially cultivated; and in these respects many of the A. writers are distinguished. But what no study and no efforts could give—the spirit, namely, that animated the earlier Greek poetry, was, in most of these works, wanting. In place of it, there was displayed greater art in composition; what had formerly been done by genius, was now to be done by the rules furnished by criticism. Only a few display real genius; the works of the rest, faultless according to rule, are destitute of life and soul. In a school, where imitation and rule thus took the place of inspiration, each generation of disciples became more artificial and lifeless than their masters. Criticism degenerated into frivolous fault-finding, and both prose and poetry became labored affectation.

The ALEXANDRINE PHILOSOPHY is characterized by a blending of the philosophies of the east and of the west, and by a general tendency to *eclecticism*, as it is called, or an endeavor to reconcile conflicting systems of speculation, by bringing together what seemed true in each. Not that the A. philosophers were without their sects; the most famous of which were the Neo-Platonists (q.v.). Uniting the religious notions of the east with Greek dialectics, they represent the struggle of ancient civilization with Christianity; and thus their system was not without influence on the form that Christian dogmas took in Egypt. The amalgamation of eastern ideas with Christian, gave rise to the system of the Gnostics (q.v.), which was elaborated chiefly in Alexandria.—The A. school was no less distinguished for the culture of the mathematical and physical sciences, which here reached a greater height than anywhere else in ancient times. As early as the 3d c. B.C., Euclid had here written his great work on geometry. The astronomers of the A. school were distinguished from all their predecessors by their setting aside all metaphysical speculation, and devoting themselves to strict observation. Among the distinguished physicists and mathematicians of the A. school were Archimedes, Eratosthenes, Aristarchus of Samos, Ptolemæus, etc. For about 4 c. the A. school was the center of learning and science in the ancient world. Counting from its origin to its complete extinction, it lasted 1000 years.

ALEXANDRINES are rhyming verses consisting each of 12 syllables or 6 measures. The name is most probably derived from an old French poem on Alexander the Great, belonging to the 12th or 13th c., in which this measure was first used; according to others, it was so called from the name of one of the authors of that poem being Alexander. The A. has become the regular epic or heroic verse of the French, among whom each line is divided in the middle into two hemistichs, the sixth syllable always ending a word. In English, this rule is not always observed, as in the following verse from Spenser:

That all the woods shall an|swer, and their echo ring.

The only considerable English poem wholly written in A. is Drayton's *Polyolbion*; but the Spenserian stanza regularly ends in an Alexandrine, and the measure occurs occasionally in our common heroic verse, as the last line of a couplet:

When both are full, they feed our blest abode,
Like those that watered once the paradise of God.—*Dryden*.

ALEXAN'DROPOL, or **GOOMRI**, a fortified t. in the Caucasus, 85 m. s.w. of Tiflis, an important strategic point commanding the entrance to Armenia. The fort is 300 ft. above the town level, and is large and strong. Pop. '91, 24,230.

ALEXANDROV, town in the government of Vladimir, in the center of the empire. It was a favorite summer residence of the czar Ivan Vasiliewitch, who introduced there the first printing-press known in Russia. It has also a magnificent imperial *stud*, commenced by the Empress Elizabeth in 1761, and completed about 20 years after. Pop. 5700.

ALEXAN'DROVSK, a t. in the s. of Russia, capital of the district of the same name situated on the left bank of the Dnieper, below the cataracts. It is 56 m. s. of Ekaterinoslav, is fortified, and has considerable trade. Inland productions are shipped here for the Black sea. Pop. about 6700.

ALEXEI, ALEXANDROVITCH, third son of Alexander II. of Russia, b. 1850. In 1872 he traveled through the United States, meeting a very kind reception. He became a grand duke, admiral, major-general, etc.

ALEXEI MICHAILOWITCH, the 2d Russian czar of the house of Romanow (b. March 10, 1629—d. Jan. 29, 1676), succeeded his father, Michael Fedorowitch, in 1645. The young czar A., yielding himself to the control of his chancellor, Plessow, and his tutor, Morosow, the avarice of these bad advisers caused an insurrection in 1648, in which Plessow lost his life. Popular discontent favored the plans of two pretenders to the throne—Demetrius III. (q. v.) and Ankudinow. The latter, professing to be a son of the czar Wasili Shuiskoi, was executed at Moscow in 1653. A. possessed good qualities, which appeared when he came to riper years. In his two campaigns against the Poles (1654-1656, and 1660-1667), he took Smolensko, conquered and devastated almost the whole of Lithuania, and even secured for himself the possession of several provinces. He also gained a part of the Ukraine; and though his war with Sweden (1656-1658) was unfortunate, he lost nothing by the following peace. A. conferred great benefits on his countrymen, by the introduction of various important reforms into the Russian laws; he ordered translations of numerous scientific works, chiefly of a military nature, into Russian; and even ventured on some ecclesiastical changes. In his private character, he was amiable, temperate, and pious. His second wife, the beautiful Natalia Narischkin, was the mother of Peter the Great.

ALEXEI, PETROWITCH. The eldest son of Peter the Great of Russia, was b. at Moscow, Feb. 18, 1690. Having shown himself opposed to the reforms and innovations made by the emperor, he was excluded by Peter from the line of succession to the throne. With this decision he appeared to be satisfied, and declared his intention of spending the remainder of his days in a monastery. But when Peter the Great undertook his second tour in northern Europe, A., under the pretence of following the czar, escaped in 1717 to Vienna, and thence went to Naples. He was induced to return to Russia, where, by the ukase of Feb. 2, 1718, he was disinherited, and an investigation was ordered to detect all parties concerned in his recent flight from Russia. His mother, Eudoxia, with Marie Alexiewna, step-sister to the czar, and several other eminent persons, were made prisoners, and either executed or otherwise punished. A. was condemned to death, but soon afterwards received a pardon. However, the terror and agitation of the trial so affected his health, that he d. June 26, 1718. The czar, to avoid scandal, ordered the trial to be published. Other accounts assert that A. was beheld in prison. By his wife, Charlotte Christine Sophie, princess of Brunswick-Wolfenbüttel, A. left a son, who, as Peter II., was elevated to the throne.

ALEXIS. See **ALEXEI**.

ALEXIUS COMNENUS, one of the ablest rulers of the Byzantine empire, was b. at Constantinople in 1048. He was the third son of Johannes Comnenus, the brother of the emperor, Isaac Comnenus. The family came originally from Italy, and settled in Asia Minor. His father having refused the purple on the abdication of Isaac, it was given to one Ducas, the son of a distinguished general. A. in his youth gave brilliant promise of the vigorous military genius which he afterwards manifested; and at length, after a series of anarchic reigns of brief duration, his soldiers succeeded in elevating him to the throne, while the old and feeble Nicephorus Botaniates, his predecessor, was obliged to retire to a monastery. Gibbon graphically paints the position and achievements of A. in the 48th chapter of his *Decline and Fall of the Roman Empire*. Everywhere he was encompassed with foes. The Scythians and Turks were pouring down from the north and north-east; the fierce Normans, who had violently effected a lodgment in Sicily and Italy, were menacing his western provinces; and, finally, the myriad warriors of the first crusade had burst into his empire on their way to Palestine, and had encamped around the gates of his capital. Yet he contrived to avoid all perils and disgraces by the wisdom of his policy, the mingled patience and promptitude of his character, his discipline in the camp, and his humanity on the throne. He reigned for 37 years; and if it had been possible to preserve the weak and corrupt Byzantine empire in its integrity, a ruler like A. might have done it. He could only delay its inevitable destruction. Undoubtedly, the great interest which attaches to A. arises from his relation to the crusaders. Historians differ as to the purity and sincerity of his conduct towards them. His daughter Anna, who wrote his life, defends his "policy" with filial piety; but it seems clear that he entertained a profound dread and suspicion of the half-civilized Franks, and, knowing the weakness of his own empire, was compelled to dissimulate. He certainly promised them help, and persuaded them to go off into Asia; it is equally certain that he did not fulfill his promises, and that he simply used them as instruments to reconquer from the Turks the islands and coasts of Asia Minor. Perhaps, however, little apology is needed for a monarch who "subdued the envy of his equals, restored the laws of public and private order, caused the arts of wealth and science to be cultivated, and transmitted the scepter to his children of the third and fourth generation." He died in 1118.

ALFA, one of the varieties of esparto (q. v.) valuable for paper-making.

ALFALFA, the name given on the Pacific coast to Lucerne (q. v.), a perennial forage plant extensively grown both in America and in Europe, where it has been cultivated

from a remote period. It produces large crops, as it may be mown several times in a year; is hardy, endures great drought, and is peculiarly adapted to light soils. Some farmers in the north sow it broadcast; in the south it is generally sown in drills.

AL-FARA BI, **ABU NASR MUHAMMED IBN TARKHAN**, one of the earliest of Arabian philosophers, living in the 10th century. He was court physician, and a student of medicine and philosophy. He enumerates six orders of science: 1, language or grammar; 2, logic; 3, mathematics, embracing geometry, arithmetic, optics, the science of the stars, music, and weights and measures, the star science including astronomy, climates, astrology, dreams and auguries; 4, natural science; 5, civil science, including jurisprudence and rhetoric; 6, divine science, or metaphysics. This remarkably approximates the modern classification. He assumes that there must be some supreme necessary existence to account for the existences which we perceive as actual; and this supreme necessary existence has infinite life, wisdom, power, and goodness, but is an absolute unity without distinguishing attributes.

ALFIERI, **VITTORIO**, COUNT, a modern Italian dramatic poet, was b. at Asti, in Piedmont, on the 17th Jan., 1749. He received a very defective education in his father's house, and was then sent to the academy of Turin, which he quitted, as ignorant and uninformed as he had entered it, to join a provincial regiment. After a hurried tour through the greater part of Europe, he returned to Turin in 1772. He then left the military service, and renouncing idleness and unworthy amours, devoted himself to literary occupation. The applause which his first attempts received, encouraged him in his determination to win fame as a dramatic author. But as he clearly saw the deficiencies of his education, he began at a mature age to learn Latin, and also to study the Tuscan dialect, for which purpose he went to Tuscany. On his journey thither, A. made the acquaintance of the countess of Albany (q.v.), to whom he became deeply attached. To render himself worthy of her esteem, he strove with unremitting earnestness after poetic excellence; and in order to be perfectly free and independent of all other cares, he transferred his whole property to his sister, in exchange for an annuity. A. now lived alternately in Florence and in Rome. Afterwards, when his friend the countess was released from other ties by the death of her husband, they lived together in the closest intimacy in Alsace or in Paris, where A. was incessantly occupied in writing, revising, and publishing his works. There appears to have been a marriage, although it was never made public. On the first outburst of the French revolution, A. went to England, but soon returned to Paris. In 1792 he was again forced to flee from France, and he then settled with his inseparable companion in Florence. Here he d., on the 8th Oct., 1803. The ashes of A. and those of his friend repose in the church of Santa Croce, in Florence, under a beautiful monument by Canova, between the tombs of Michael Angelo and Macchiavelli. As a dramatic author, A. has attempted three different departments of his art. He published 21 tragedies, 6 comedies, and 1 "tramelogedia," a name invented by himself. His dramatic works show a want of fresh imaginative vigor, and betray the laborious perseverance with which he did violence both to himself and to art. A. was inspired more by politics than by poetry. He wished to breathe a spirit of freedom into the dormant minds of his countrymen, and considered the theater as a school in which the people might learn to be "free, strong, and noble." In order to preserve the purity of his muse, A. had resolved to read no other poet. He wished to produce an effect by the very simplest means, and, renouncing the aid of ornament, to please by manly strength and earnestness alone. His works are on this account cold and stiff, his plots simple even to poverty, his verse hard and unpleasing, and his language destitute of that magic splendor of coloring which stirs the inmost soul. Notwithstanding this, A. did good service to Italian tragedy. He corrected the effeminate taste which had before prevailed, as well as the pedantry of an affected imitation of Attic models. Succeeding writers endeavored to imitate his strength and simplicity. A. was more unsuccessful in his comedies than in his tragedies. They manifest the same serious political tendency; the invention is poor, the development of the plot uninteresting, and the characters are only general sketches, without individuality. The most successful of his dramatic works is *Abel*, a mixture of tragedy and opera, invented by himself, which he designated by the singular name of "tramelogedia." Besides the dramatic works of A., we possess an epic poem, in four cantos, written by him, also many lyrical poems, 16 satires, and poetical translations of Terence, Virgil, and portions of Æschylus, Sophocles, Euripides, and Aristophanes. After his death, appeared his *Misogallo*, a memorial of his hatred to the French. The countess of Albany had a collected edition of his works published (35 vols. 4to, Pisa, 1805-1815) containing his autobiography; Centofanti published *Tragedie e Vita d'Alfieri* (Florence, 1842).

ALFON'SINE, or **ALPHONSINE TABLES**, certain astronomical calculations made by the ablest men of the period for Alphonso of Castile (1231-84). A room in the palace at Segovia is still shown as Alphonso's observatory. The tables were compiled in 1252, the year that A. came to the throne, and first published in 1483.

ALFONSO I., of Navarre and Aragon, succeeded Pedro I. in 1104. He united Castile to his kingdom by marrying the daughter and heiress of Alphonso VI. of Leon and Castile, and thereupon assumed the title of "Emperor of all Spain." A. was surnamed

"the fighter," and his victories were mainly over the Moors. In 1118 he took Saragossa after a siege of three years. In 1120, he slew 20,000 Moors on the field of Daroca. In 1123, he invaded Valencia, and two years later he went to the aid of the Christian Moors in Granada. In 1130, he crossed the Pyrenees and captured Bordeaux and Bayonne. He d. in 1134.

ALFONSO V., King of Aragon, Naples, and Sicily (1416-58 A.D.), received the surname of "the magnanimous," because on his accession to the throne he destroyed a document containing the names of all the grandees who were hostile to him. His historical importance arises from his having brought southern Italy under the dominion of Aragon. In 1420, he attacked Corsica, but speedily hastened to Naples, at the request of queen Joanna II., who besought his assistance against Louis of Anjou. For some time he enjoyed the highest favor; but in 1423, having thrown into prison her minion Caraccioli, who was his enemy, the queen declared for his rival, Louis. At her death, in 1435, A. resolved to claim the kingdom; but René of Anjou, whom Joanna had appointed her successor after the death of Louis, opposed him. Rome and Genoa sided with René, and the Genoese fleet attacked and defeated that of A., the monarch himself being taken prisoner. He was sent to duke Philip of Milan, who, charmed by his manner and talent, set him at liberty, and even formed an alliance with him. After several battles, and a long mountain-war in the Abruzzi, A. overthrew his adversary, and entered Naples in triumph. Having once firmly established his power, he proceeded to suppress the disorders which had sprung up during the worthless reign of Joanna, and honorably distinguished himself by his patronage of letters. He d. at Naples while his troops were besieging Genoa, June 27, 1458.

ALFONSO I., of CASTILE (VI. of Leon), 1030-1109; surnamed "the Valiant." Leon was given to him by his father, while Sancho, the eldest son, received Castile; and Garcia, youngest of the three, was given a part of Galicia and Portugal. War soon began among them, and in 1068 Sancho defeated A. in a bloody battle on the Pisurga. Three years later A. defeated Sancho on the Carrion; but during the night Sancho was reinforced, it is said, by the renowned Cid, Roderigo Diaz de Bivar, nearly exterminated the Leonese army, took A. prisoner, compelled him to abdicate, and shut him up in a monastery. A. escaped and sought shelter with the Moorish king of Toledo. Sancho took possession of Leon and immediately went against Garcia, defeating and capturing him at Santarem. In 1073, Sancho was secretly killed, and A., upon solemnly declaring himself innocent of the murder, was reinstated in his kingdom of Leon, to which was added Castile. His brother Garcia, who was preparing to recover the throne of Galicia, was treacherously invited to A.'s court, made a prisoner, and ten years afterwards died in confinement. A. now ruled over nearly all of his father's kingdom, and went to the assistance of the Moorish king who had befriended him, and whose kingdom was invaded by the Cordovans. A.'s gratitude ended with the death of the old king; he did not scruple to attack the son, and soon captured the city of Toledo. A. was monarch of nearly the whole of Spain, when a powerful Almoravide army from Africa, with the assistance of the king of Seville, gave him a terrible defeat, in 1086, near Zalaca. He recovered after a time, but in 1108 the Moors destroyed his army and killed his only son. The next year A. died, and was succeeded by his daughter Urraca, who became the wife of Alfonso I. of Aragon. By an illegitimate daughter A. became an ancestor of the king of Portugal.

ALFONSO III., surnamed THE GREAT, King of Leon, Asturias, and Galicia, b. 848 A.D. He succeeded his father, Ordoño I., in 866, but had to maintain his rights by force of arms against count Froila, who had usurped the throne. Having caused the latter to be murdered, he proceeded sternly to reduce to obedience the powerful nobility of the kingdom, who looked with a jealous eye on the monarchy remaining in one family; and then, carrying his arms against other enemies, he fought through more than 30 campaigns, and gained numerous victories over the Moors. He crossed the Douro, broke down the walls of Coimbra, penetrated to the Tagus and Estramadura, enlarged his territories by a portion of Portugal and old Castile, and re-peopled the conquered and desolated Burgos. But these wars entailed great expense and misery on the nation. In 888, A. had to endure the pain of beholding, at the head of a rebel army, his own son Garcias, who wished to seize the crown, although pretending a simple desire for the prosperity of the commonwealth. A. collected his forces, conquered his son, and threw him into prison. But Garcias' mother, by the help of several of the grandees, excited a new conspiracy, which resulted in the abdication of the monarch in favor of his imprisoned son. In order, however, to be still useful to his country, A. became commander of Garcias' forces in an expedition against the Moors. After returning in triumph, he d. at Zamora, 910.

ALFONSO VI., of LEON. See ALFONSO I., of Castile.

ALFONSO X., surnamed "the astronomer," "the philosopher," or "the wise" (*el sabio*), king of Leon and Castile, b. 1221, succeeded his father, Ferdinand III., in 1252. As early as the storming of Seville in 1248, he had given indications of his courageous spirit. But, instead of wisely attempting to expel the Moors and subdue the nobility, he lavished the resources of his kingdom in fruitless efforts to secure his election to the

imperial throne of Germany. Rudolph of Hapsburg was chosen in opposition to him. Nor would pope Gregory X. recognize his claims even to the duchy of Swabia. Soon after, his throne was threatened by the turbulence of the nobility and his wars with the Moors. The latter, however, he defeated in 1263, in a bloody battle, and took from them Xeres, Medina-Sidonia, San-Lucar, and a part of Algarve, uniting at the same time Murcia with Castile. In 1271, an insurrection broke out in his dominions, at the head of which was his son Philip. Three years elapsed before it was finally quelled. In the mildness with which he treated the rebels, men saw only indications of his weakness. But afterwards determining to employ more stringent measures, his son Sancho also rebelled, and in 1289 deprived him of his throne. He now sought the help of the Moors, but after fruitless efforts to recover his power, he died at Seville, April 4, 1284. He was the most learned prince of his time, and has acquired lasting fame through the completion of the code of laws commenced (though this is disputed) by his father, and called *Leyes de las Partidas*, which in 1501 became the universal law of the land. There are still extant several long poems of his, besides a work on chemistry, and another on philosophy. He is also credited with a history of the church and of the crusades, and is said to have ordered a translation of the Bible into Spanish. He labored much to revive knowledge, increasing both the privileges and professorships of the university of Salamanca. He sought to improve the Ptolemaic planetary tables, whose anomalies had struck observers even at that early time. For this purpose, in 1240, he assembled at Toledo upwards of 50 of the most celebrated astronomers of that age. His improved tables, still known under the name of the Alfonsine tables, were completed in 1252. See ALFONSINE TABLES.

ALFONSO I., of NAPLES and SICILY. See ALFONSO V., of Aragon.

ALFONSO I., earliest king of Portugal, was the son of Henry of Burgundy, conqueror and count of Portugal. He was born in 1110 A. D., and being only 2 years of age at his father's death, the management of affairs fell into the hands of his ambitious and dissolute mother, Theresa of Castile, from whom he was compelled forcibly to seize it on attaining his majority. He then entered on a war with Castile, whose supremacy he did not recognize, and, leaguely himself with Navarre, made several conquests in Galicia, after which he proceeded to attack the Moors, whose invasions he had already begun to check by building the fortress of Leiria. A battle was fought in the plains of Ourique, July 25, 1139, when victory declared for the Portuguese, after a bloody struggle, in which, it is said, not less than 200,000 Moors perished. From that day, A. assumed the title of king, which the pope confirmed. On the 25th of Oct., 1147, he took Lisbon, by the help of the English fleet of crusaders; and in 1158, after a siege of 2 months, made himself master of Alcazar-de-Sal and Evora. In 1171, he took by assault the fortress of Santarem from the Saracens, and annihilated the garrison; and at the same place he defeated the Almohadian ruler, Jusuf-ben-Jakub, in 1184. He invited to his land the knights-templars and knights of St. John, and established the orders of Avis and of St. Michael. He died at Coimbra, Dec. 6, 1185.

ALFONSO V., of PORTUGAL, 1432-81; surnamed "Africano," in honor of his victories over the Moors in Algiers. He succeeded his father in 1438, but did not govern until 1448, his uncle being regent in the mean time. A. declared this uncle to be a rebel, and defeated him in a battle in which he was slain. After a campaign in Africa, A. undertook to seize upon Castile and Leon, but was defeated at Toro. A. tried to get assistance from the king of France, but found that monarch deceiving him, and abdicated in favor of his son Juan. The son refused, and A. reigned two years longer, when he fell into a deep melancholy and retired to a monastery, where he died.

ALFONSO VI., b. 1643, King of Portugal, second son of John IV., was destined for the church, but the death of his elder brother in 1656 altogether changed his circumstances. Being then a minor, the government of the kingdom was intrusted to his mother, Louisa de Guzman, a woman of great wisdom and prudence, who felt it her duty to retain the power in her own hands, even after A. had reached his majority; for the sickly and dissolute prince displayed little aptitude for business. But the court minions, who had their own reasons for wishing him to rule, urged him to remove his mother from her office. This was accomplished in 1662. The minister, count Castel-Melhor, a mere trifler, possessed supreme authority. Nevertheless, Portugal was victorious in the war which she undertook against Spain, although for this she had to thank her English and French allies. In 1666, A. married Maria-Francisca-Elizabeth of Savoy, who, however, soon conspired with his brother Pedro against him. The plot succeeded. A. was seized and imprisoned at Cintra, where he died on the 12th of Sept., 1683. Pedro then obtained the throne, and married the widow of his deceased brother.

ALFONSO XII., King of Spain, b. Madrid, Nov. 28, 1857, son of ex-queen Isabella II.; was proclaimed king, Madrid, 1874, Dec. 31. He married, 1878, Jan. 3, princess Maria de las Mercedes (youngest daughter of the duke de Montpensier), who d. 1878, June 26. He married, 1879, Nov. 29, archduchess Maria Christina of Austria (daughter of archduke Charles Ferdinand, by whom he had three children. Returning from an informal visit to Germany, 1883, where he was made colonel of a Uhlan regiment (a distinction without political significance), he was publicly insulted in Paris, and war with France was for a few days thought probable. At the opening of the Cortes, 1883, A. announced the extension of suffrage, and proposed bills for civil marriages and trial by jury. He d. 1885, Nov. 25. His posthumous child, Alfonso XIII., succeeded him.

ALFORD, REV. HENRY, D.D., a biblical critic of the highest reputation, and also a poet of considerable genius, was born in London in 1810, but was educated first at Ilminster grammar-school in Somersetshire, and finally at Trinity college, Cambridge, where he took his degree, and entered the church. His first volume, published at Cambridge in 1831, was entitled *Poems and Political Fragments*. Three years afterwards, the young author was elected a fellow of Trinity, and in the following year, 1835, appeared his most popular work, *The School of the Heart, and other Poems*, which has been frequently reissued, especially in America. About the same time A. was appointed vicar of Wymeswold, Leicestershire, where he remained till 1853, gradually enlarging the circle of his studies, and obtaining fresh honors. In 1841 he published *Chapters on the Greek Poets*, which exhibit both purity of taste and breadth of scholarship. In 1844, appeared the first volume of his *magnum opus*, the *Greek Testament*, with notes and various readings; the second was not published till 1852. In 1853, he was removed to Quebec street chapel, London, where he continued to maintain his high reputation as a sound and eloquent preacher, until, in 1857, he was appointed dean of Canterbury by lord Palmerston. A.'s poetry is characterized not so much by depth or originality as by freedom from affectation, obscurity, or bombast. His *Greek Testament*, which was completed in 1861, occupies the first rank among English editions. Among his latest writings was *A Plea for the Queen's English*, which excited considerable discussion. He also published several volumes of sermons. He d. Jan. 12, 1871.

ALFRED, surnamed **THE GREAT**, was b. at Wantage, in Berkshire, in 849. His father was Ethelwolf, son of Egbert, king of the West Saxons; and though the youngest of four sons, he succeeded to the throne, on the death of his brother Ethelred, at the age of 23. He had already given decisive proofs of high ability as a general in repelling the incessant incursions of the Danes, at that time the most terrible warriors in Europe. After he succeeded to the throne, he redoubled his exertions to restore the independence of his country. At first he strove without success, whilst the Danes continued to pour fresh bands upon the coast, and the Anglo-Saxons either bent to the yoke or forsook their homes. In 878 the invaders had completely overrun the whole kingdom of the West Saxons. A., no longer able to collect an effective army, was obliged to seek security in the hills and forests, and for some time found refuge in a cowherd's hut. He still, however, kept up some communication with his friends; and as soon as the people began once more to arm against the Danes, he built a stronghold on an elevation or island (still known as Athelney, i.e., the "island of the nobles," or the "royal island") amid the marshes of Somersetshire, to which he summoned his faithful followers. From this fortress he made frequent successful sallies against the enemy, and after a comparatively short time, he found himself at the head of a considerable army, with which he totally routed them, 878, near Edington, in Wiltshire. After holding out for some time in a stronghold to which they had retreated, the invaders capitulated. A. accepted hostages, and their solemn oath to quit his territory of Wessex, and receive baptism. Their king, Godrun or Guthrun, was baptized, with thirty of his followers, and ever after proved faithful in his allegiance to A.

After this decisive victory, the power of A. steadily increased, both by land and sea—for already he had built England's first fleet—he beat the Danes in numerous battles, and gradually their possessions were confined to the northern and eastern coasts. In 886, A., without any formal installation, became recognized as the sovereign of all England, a title to which he had proved his right by the most indisputable of arguments. During the ensuing years of peace, he rebuilt the cities that had suffered most during the war, particularly London; erected new fortresses, and trained the people to the use of arms; while at the same time he encouraged husbandry and other useful arts, and founded those wise laws and institutions which contributed so much to the future greatness and welfare of England. The grateful reverence of posterity has, as is usual with mankind, become prodigal in its awards, ascribing to A. the entire credit of having established many beneficial institutions, some of which had already existed among the Anglo-Saxons, but were by him revived, remodeled, and improved. Of his political institutions, little is known beyond the fact that he compiled a code of laws, divided England into counties, hundreds, and tithings, and thoroughly reformed the administration of justice by making these tithings, hundreds, etc., so far as was practically possible, responsible for the offenses committed within their jurisdiction. William of Malmesbury, with enthusiastic exaggeration, declared that a "purse of money, or a pair of golden bracelets," might in A.'s day be exposed for weeks in complete safety on the common highways. A. is also said—though erroneously, as is now believed—to have been the author of "trial by jury." In an age of ignorance and barbarism, A. was an accomplished scholar and a zealous patron of learning. No prince of his age did so much for the diffusion of knowledge, and few monarchs at any time have shown an equal zeal for the instruction of their people. He caused many manuscripts to be translated into Anglo-Saxon from Latin, and himself translated several works, such as Boëthius on the *Consolation of Philosophy*, the *History of Orosius*, Bede's *Ecclesiastical History*, and *Selections from the Soliloquies of St. Augustine*. Among his original works in the Anglo-Saxon language are *Laws of the West Saxons*, *Institutes*, *Chronicles*, *Meditations*, etc. All his works strikingly indicate the serious, elevated, and yet practical character of the man. In his translations, A. is frequently more than a translator. He adds his own reflections

to those of his author; and expands the geographical outline of Orosius by a chart of Germany, an account of the Baltic, and the icy regions towards the north pole, which are pretty accurate, considering the means which then existed for acquiring a knowledge of these places. Several works attributed to A. are believed not to be genuine.

The peaceful labors of A. were, in 893, interrupted by a fresh invasion of Northmen under Hæsten or Hastings, more formidable than any that had yet been attempted in his reign. The defection of the East Anglians and Northumbrians added to the difficulties with which he had to contend. A., however, was fully prepared, and though, during their protracted stay in his dominions, the invaders overran a large extent of country, and committed considerable depredations, they were beaten in almost every encounter with the English, and finally quelled. A. died on the 27th of Oct., 901, aged 52, leaving his country in the enjoyment of comparative peace and prosperity, the fruit of that wise and energetic rule which has made his memory dear to all generations of Englishmen as that of their best and greatest king. We cannot perhaps realize the resolute patience of A., in his political and military capacity, for we have but a very imperfect knowledge of the obstacles which stood in his way; but it must excite both our highest wonder and reverence to behold a man pursuing solitarily, in the midst of ferocity, barbarism, and ignorance, and in spite of the perpetual pains with which his body was racked, so many various and noble schemes for the civilization and true glory of his country.—The most authentic and interesting of the original sources of information on the history of A. is the life by Asser, bishop of Sherborne, a book distinguished by extreme simplicity and affection. The best edition is that of Wise, Oxford, 1782. Of the recent lives, the most complete and careful are that of Prof. Reinhold Pauli, edited by T. Wright, and that by Mr. T. Hughes, 1869.

ALGA MARINA. See GRASSWRACK.

ALGÆ, a natural order of plants, belonging to the class *cryptogamia* of Linnæus, and to the *acotyledones* of the natural system. It contains a great number of species, about 2000 being known and described, and among these there is a great variety of forms. They grow for the most part in water, some in fresh and some in salt water, but some also on moist rocks or ground; whilst others are frequently found covering the glass and pots of hot-houses. Some species occur even upon diseased animal tissue, as *achlya prolifera* from the gills of fish, whilst *sarcina ventriculi* (q.v.) appears to be formed in the human stomach. They are most numerous in still or stagnant water and in warm climates. Their structure is very various; they are found of all grades, from the little microscopic vesicle to great sea-weeds, which ramify like trees. The diversity in size is as great as in form; some species being visible only through the microscope, and resembling mold or rust; some a few inches, others several feet in length; whilst the *laminariæ*, which float in the South American seas, measure more than 100 ft.; and *macrocystis pyrifera* of the Pacific ocean reaches the length of 1500 ft. Yet they are seldom to be found as thick as the finger, or as broad as the hand, although some far exceed these dimensions, the trunk of *lessonta fuscescens* attaining the thickness of a man's thigh. Some species are firmly fixed at the bottom of the water, some adhere to rocks and stones left dry by the retiring tide; some frequently break loose, and float about upon and beneath the surface. They have in no case proper roots, but merely processes for their attachment to the surfaces on which they are fixed; they seem to derive their nourishment by all parts of their surface from the water or moist air in which they grow. The gulfweed (*sargassum*) floats in long pieces in the Atlantic ocean and all the great seas; a large portion of the sea between the West Indies and the Canary islands is specially called the *Mer de Sargasse*. The weed is carried in such quantities by the current into the gulf of Mexico, that it covers the sea in tracts of many miles in breadth, and gives it the appearance of a meadow. Many fabulous stories were related of this gulfweed by the mariners of the 15th century. Ships were said to have been stopped in their course, and the crews obliged to cut their way through with hatchets. The discoveries of Columbus put an end to these exaggerated reports.

A. are entirely cellular in their structure, however elongated may be their fronds, having no proper vessels, but consisting of an irregular tissue of utricular cells. The fronds of many are articulated. Some of the simplest or lowest organization are propagated by spontaneous separation; in others, the reproductive organs consist of spores (see ACOTYLEDONOUS PLANTS) inclosed in *perispores*, and variously disposed in receptacles of different kinds; sometimes in the interior of the cells. *Antheridia* (q.v.) also occur in some; and *zoospores*, or spores with moving *cilia*, which exhibit phenomena of motion resembling those of animal life. The *diatomaceæ*, in which the ordinary mode of reproduction is by spontaneous separation, have by some been referred to the animal kingdom. They are entirely microscopic, resemble the animalcules called *infusoria*, and are generally found in still waters and moist places, but occur in prodigious numbers in some parts of the Antarctic ocean, where they give a color to the water.

A. differ from fungi (q.v.) in deriving their nourishment exclusively, as it would seem, from the medium by which they are surrounded, and not from the substance upon which they grow. The substance of which they are composed is also very different. Yet it has been felt not a little difficult to determine to which order some of the lowest forms of vegetable life should be referred.

As to their substance, A. consist chiefly of vegetable gelatine, which dissolves in

water when they are boiled in it. The harder parts of their fronds are sometimes coriaceous, or horny, or cartilaginous, but never really ligneous. Their color is not always green, but mostly brown or yellow, sometimes purple or violet, or rose-color; and many of them present a very beautiful appearance when examined through a microscope. Many contain an abundance of iodine. Different species of WRACK (*fucus*) (q.v.), which are cast on shore in vast confused masses by the waves, are gathered and burned in the Orkney islands, in Normandy, and other parts of the world, the ashes forming an article of commerce under the name of KELP (q.v.), and containing much of the iodide of sodium. Sea-weeds of all kinds are an excellent manure. None of the species are poisonous, and some of them are used for food, a CARRAGEEN (q.v.) or Irish-moss, DULSE (q.v.), LAYER (q.v.), etc. The edible swallows' nests of the Indian archipelago are composed of a species of sea-weed. Several kinds are eaten as articles of luxury by the Chinese. *Plocaria tenax*, one of the species so used, furnishes them also with an admirable glue, of which great quantities are prepared and brought to the market. *Plocaria helminthocorton*, Corsican moss, a native of the Mediterranean, and found principally around the shores of Corsica, is used as a vermifuge. See PLOCARIA.

This natural order is divided into 5 sub-orders, regarded by some as distinct orders—namely, CHARACEÆ (q.v.), FUCACEÆ (q.v.), CERAMACEÆ (q.v.), CONFERVACEÆ (see CONFERVA), and DIATOMACEÆ (q.v.). The Characeæ are sometimes separated as a distinct order of higher organization, whilst the rest are united under the name algæ. See Kützinger's *Phycologia Generalis* (Leip. 1843), and his *Species Algarum* (Leip. 1849); Greville's *A. Britannicæ* (Lond. 1830); *British Sea-weeds*, nature-printed (London); Harvey's *British Marine A.*, and *Nereis Boreali-Americana*; Farlow's *Marine A. of New England* (Boston, 1881).

ALGAR DI, ALESSANDRO, an Italian sculptor, b. at Bologna 1602, d. 1654, ranked next to Lor. Bernini among Italian sculptors of the 17th c., and especially excelled in the representation of nude figures. His works, however, suffered from the faults prevalent in his time, especially from a striving after pathos and picturesque effects, opposed to the true character of sculpture. His most important work is a colossal relievio of Attila in St. Peters, Rome. His statue of the god of sleep in the villa Borghese has frequently been mistaken for an antique.

ALGARO BA. See CAROB.

ALGAROT TI, FRANCESCO, Count, an Italian author, was b. at Venice in 1712; studied in Rome and Bologna, and when 21 years old published in Paris (1733) a work, entitled *Newtonianismo per le Dame* (The Newtonian Philosophy adapted to the Ladies), which was the basis of his subsequent reputation. Until 1739, he lived in France. On his return from a journey to Russia, A. became acquainted with Frederick II. of Prussia, who elevated him to the rank of count, and made him, in 1747, lord chamberlain. He was also patronized by Augustus III. of Poland, and lived alternately in Berlin and Dresden until 1754, when he returned to Italy. He d. March 3, 1764, at Pisa, where, in the Campo Santo, Frederick the Great raised a monument to his memory. In his own time he was recognized as a good judge of painting and architecture, and his reputation is confirmed by his work *Saggi sopra le Belle Arti* (Essays on Fine Arts), and by the paintings he selected for the Dresden gallery. His poetry displays no great genius; but his other works show that he was an accomplished man; and his letters rank with the best in the Italian language.

ALGAROVIL LA, an astringent product of *Juga marthæ*, an acacia of New Granada; said to be four times as rich in tannin as the best oak bark. Black ink is made from it; also a yellow dye; and it is useful in medicine.

ALGAR VÊ, the smallest and most southerly of the provinces of Portugal, lies between Andalusia and the Atlantic ocean. In ancient times it was much more extensive. It received its name from the Arabs, in whose language A. signifies "a land lying to the west." It was a Moorish province till 1253, when Alphonso III. united it to the crown of Portugal as a separate kingdom. Its area is estimated at 1873 sq.m., and its pop. is (1890) 228,551. The northern part of the province is occupied by a range of mountains of an average height of 4000 ft., which form the continuation of the Sierra Morena of Spain, and terminate in cape St. Vincent, the south-western extremity of Europe. The highest ridges are entirely destitute of vegetation; and the mountainous tract in general admits of but little cultivation. From the main ridge the country slopes southward in jagged terraces and low hills, leaving a level tract of a few miles along the coast. The soil of this plain is but indifferently suited for the production of grain, or even of pasture; but it produces abundance of the finest fruits of the south, even plantains and dates. The wine is also of excellent quality. The African heat of the climate is mitigated by the cool sea-breeze. The only river of importance is the Guadiana, on the frontiers of Spain. The inhabitants employ themselves chiefly in fishing, in manufacturing salt, and in cultivating fruit. The chief t. is Faro (pop. 8600).

AL-GAZALI, ABU HAMED MUHAMMAD, 1058-1111; a Moslem theologian of the Ascharite sect, the head of the college at Bagdad. He visited the holy sepulchre at Jerusalem, and spent 10 years in Damascus taught again in Bagdad 15 years, and spent his remaining life in retirement and philosophical speculation, settling finally with

the Sufis, and becoming satisfied with their mystical claim to an intuition of the laws of life and of the immanent Deity.

ALGEBRA is a branch of pure mathematics. The name is derived from the Arabs, who call the science *al gebr wal mokiibala*—i.e., supplementing and equalizing—in reference to the transposition and reduction of the terms of an equation. Among the Italians in early times it was called *arte maggiore*, as having to do with the higher kinds of calculation, and still oftener *regola de la cosa*, because the unknown quantity was denominated *cosa*, the “thing”; hence the name of *cosike art*, given to it by early English writers.

The term algebraical is generally used somewhat vaguely, to denote any expression or calculation in which signs are used to denote the operations, and letters or other symbols are put instead of numbers. But it is perhaps better to restrict the name A. to the doctrine of equations (q.v.). Literal arithmetic, then, or multiplying, dividing, etc., with letters instead of Arabic ciphers, is properly only a preparation for A.; while analysis (q.v.), in the widest sense, would embrace A. as its first part. A. itself is divided into two chief branches. The first treats of equations involving unknown quantities having a determinate value; in the other, called the diophantine or indeterminate analysis, the unknown quantities have no exactly fixed values, but depend in some degree upon assumption.

The oldest work in the west on A. is that of Diophantus of Alexandria, in the 4th c. after Christ. It consisted originally of 13 books, and contained arithmetical problems; only 6 books are now extant. They are written in Greek, and evince no little acuteness. The modern Europeans got their first acquaintance with A., not directly from the Greeks, but, like most other knowledge, through the Arabs, who derived it, again, from the Hindoos. The chief European source was the work of Mohammed Ben Musa, who lived in the time of caliph Al-Mamun (813–833); it has been translated into English by Dr. Rosen (Lond. 1831). An Italian merchant, Leonardo Bonaccio, of Pisa, traveling in the east about 1200, acquired a knowledge of the science, and introduced it among his countrymen on his return; he has left a work on A. not yet printed. The first work on A. after the revival of learning is that of the Minorite friar Paciolo or Luca Borgo (Ven. 1494). Scipio Ferreo in Bologna, discovered, in 1505, the solution of one case of cubic equations. Tartaglia of Brescia (d. 1557) carried cubic equations still further, and imparted his discoveries to Cardan of Milan, as a secret. Cardan extended the discovery himself, and published, in 1545, the solution known as “Cardan’s rule.” Ludovico Ferrari and Bombelli (1579) gave the solution of biquadratic equations. A. was first cultivated in Germany by Christian Rudolf, in a work printed in 1524; Stifel followed with his *Arithmetica Integra* (Nürnberg. 1544). Robert Recorde, in England, and Pelletier, in France, wrote about 1550. Vieta, a Frenchman (d. 1603) first made the grand step of using letters to denote the known quantities as well as the unknown. Harriot, in England (1631), and Girard, in Holland (1633), still further improved on the advances made by Vieta. The *Géométrie* (1637) of Descartes marks an epoch in A.; it is rich in new investigations. Descartes applied A. to geometry, and was the first to represent the nature of curves by means of equations. Fermat also contributed much to the science; and so did the *Arithmetica Universalis* of Newton. To these names may be added MacLaurin, Moivre, Taylor, and Fontaine. Among the chief promoters of A., in more recent times, are Euler, Lagrange, Gauss, Abel, Fourier, Peacock, De Morgan, etc.

ALGECIRAS, or **ALGEZIRAS**, a t. in Spain, in the province of Cadiz, on the gulf of Gibraltar. Its harbor is bad, but it possesses a good dock, and the inhabitants are supplied with fine aqueducts. The citadel is in a very dilapidated condition, and the trade in corn and brandy is no longer important. The place, however, which is pleasantly situated, has a picturesque appearance. It was the first t. in Spain taken by the Moors (713), in whose possession it remained for 7 centuries; but in 1344, after a siege of 20 months, it was retaken by the brave Alfonso XI., king of Castile. It is said that crusaders from all parts of Europe were present at this siege, which was *the* siege of the age, and is spoken of as such. Pop. 12,500.

ALGER, a co. of Michigan, upper peninsula, on Lake Superior, organized 1885: 983 sq. miles. It is watered by Au Train and White Fish rivers and other streams, and contains on its lake shore the noted “Pictured Rocks,” and includes Grand island. Pop. '90, 1238. Co. seat, Au Train.

ALGER, HORATIO, clergyman and author, was born at Revere, Mass., in 1834, and graduated from Harvard College in 1852. He studied divinity at Cambridge, and in 1864 was ordained over the Unitarian church at Brewster, Mass. He also engaged in journalism, and published nearly fifty volumes of stories for youth, a volume of poems, *Helen Ford, Adrift in the City* (1895), and *Frank Hunter's Peril* (1896).

ALGER, RUSSELL ALEXANDER, b. in Lafayette, Ohio, Feb. 27, 1836. He was admitted to the bar in 1859, and removed to Michigan. At the beginning of the civil war, he enlisted as a private, and in June, 1865, was brevetted maj.-gen. of volunteers for services during the war. After the war he became wealthy in the lumber trade. He became governor of Mich. in 1884, and in 1888 was a candidate for the presidential nomination in the Republican National Convention. In 1889 he was elected commander-in-chief of the G. A. R.; accepted the position of secretary of war in McKinley's cabinet (1897).

ALGER, WILLIAM ROUNSEVILLE, b. Massachusetts, Dec. 11, 1823; a graduate of Harvard in 1847: author of a *Critical History of the Doctrine of a Future Life*, *Genius of Solitude*, *Friendships of Women*, *The Sources of Consolation in Human Life* (1892), etc. He was pastor of the church of the Messiah, Unitarian, in New York city, 1875-76.

ALGER/BA, a double star in the sign Leo, noted as a test for telescopes; one component is orange and the other green.

ALGE/RIA (in French, **ALGÉRIE**), a country on the n. coast of Africa, which was a subordinate part of the Turkish empire till 1830, and is now a French colony. It lies between 2° 8' w. long. and 8° 32' e. long. It is bounded on the n. by the Mediterranean, on the e. by Tunis, on the s. by Sahara, and on the w. by Morocco. The French have extended their dominions more than 200 m. into the interior, but those of the deys—the former rulers of A.—comprehended territories lying nearly twice as far s. The area of A. is now calculated to be about 150,000 sq.m.; and the pop. (1881) 3,310,412, including about 300,000 Europeans. The chief towns are Algiers, Bona, Constantine, and Tlemzen. Upwards of 7,000,000 acres are under cultivation. Physically, A. forms a part of the northern border of the great plateau of north Africa, which here rises from the sea in three terraces. The Atlas mountains run parallel to the coast-line. Behind these, a vast tract of healthy plains, called the *sebkhas*, interspersed with salt lakes, stretches southwards, until bounded by a second chain of mountains of various heights; beyond which, again, lies the great desert of Sahara, extending to the banks of the Niger. The plains and valleys which open out towards the sea in the n. of A., such as those around Bona, Algiers, Oran, etc., are extremely fertile, abound in wood and water, consist mostly of a calcareous soil, and are well adapted for agriculture. They form the *Tell*, which was once one of the granaries of Italy. In strong contrast to these are the *sebkhas*, or lesser deserts, covered with herbs and brushwood, but almost destitute of fresh water, except where here and there they are interrupted by an oasis. The most southern part of the country beyond the Atlas partakes of the nature of the Sahara, but contains oases covered with palm trees, and well peopled. This is a part of the "date country," or "Blad-el-Djerid." There are no rivers of any importance in the entire colony, nothing beyond mere coast-streams, which rise in the neighboring Atlas. The largest is the Shelif, about 280 m. in length. With respect to the climate, the heat in the *Tell* is sometimes very great. On the coast it is mitigated by the sea-breeze, and among the high mountains of the interior the winters are even cold. The average temperature of Algiers is about 63° F. A. is not unfrequently visited by the *simoom*, or hot wind, called by the Italians *strocco*, and by the Spaniards *solano*. Its mineral wealth is considerable; iron, lead, copper, and manganese are found. The marble of Numidia was in requisition in ancient times. Extensive forests of oaks, cedars, pines, and pistachio-nut trees cover large portions of the country, and furnish an abundant supply of timber and resin. The cereals and the olive are cultivated in the *Tell*, and the oases of Sahara are famed for their dates. The domestic animals of A. are the ox, the sheep, the goat, and the camel; but the once noble race of Numidian horses is degenerated. The population is composed of various elements. Besides Europeans, there are Kabyles and Arabs, who compose the bulk of the people; also Moors, Negroes, and Jews.

Language.—Four languages are spoken in A.—the Berber, the Arabic, the Turkish, and the Negro dialects. The Berber, which is the most ancient of all, has a variety of dialects, and is spoken by all the Kabyle tribes. It possesses no literature written in its own alphabet; Arabic characters alone being used. The Arabic is of course an importation from the east, and has borrowed expressions and idioms from the various native languages with which it came into contact; but its differences are comparatively slight. The Koran is the great bond of union. The Turkish, since the French conquest, has become almost extinct. The Negro dialects are of little consequence.

History.—In the most ancient times we find the Numidians settled in the eastern part of the regency, and the Moors (or Mauri) in the west. Under the Romans, the former was included in the province of Africa, while the latter was called Mauritania Cæsariensis. Like the rest of north Africa, it had then reached its highest prosperity. It had numerous cities, which were principally Roman colonies. But its conquest by the Vandals, under the famous Genseric, about 440, threw it back into a state of barbarism, from which it only partially recovered after the Mohammedan immigrants had established their dominion. About the year 935, the city, Al-Jezira, i.e., the island, and later Al-Gazie, i.e., the warlike, now called Algiers, was built by an Arabian prince, Zeiri, whose successors ruled the land till 1148, after which it was governed by the Almohades (q.v.) till 1269. It was then split up into many small territories. In 1492, the Moors and Jews who had been driven out of Spain settled at A., and began to revenge themselves on their persecutors by piracy. Ferdinand, the Spanish monarch, attacked them on this account, took the city of Algiers in 1509, and erected fortifications on the island which forms its harbor. One of the Algerine princes, the emir of Metidja, whose territories were threatened by the Spaniards, now invited to his assistance the Greek renegade, Horuk or Harude Barbarossa, who had made himself famous as a Turkish pirate chief. This laid the foundation of the Turkish dominion; for when Barbarossa arrived in 1516, he treacherously turned his corsair bands against the emir, whom he murdered, and then made himself sultan of Algiers. His subsequent successes alarmed the Spaniards, who marched an

army against him from Oran. Barbarossa was defeated in many encounters, and at last, being taken prisoner, was beheaded in 1518. His brother was then chosen sultan. He put himself under the protection of the Ottoman court, by the help of a Turkish army drove the Spaniards out of the country, and established that system of military despotism and piracy which lasted till 1830, and which sunk A. into a state of ruinous degradation. In 1541, the emperor Charles V. made a bold attempt to crush this nation of corsairs. He landed in A. with a fleet of 370 ships and 30,000 men; but a fearful storm, accompanied by earthquakes and water-spouts, destroyed the greater portion of the former, and rendered the latter destitute of victuals, etc.; so that the expedition proved a failure, and Charles was glad to re-embark, which he managed to do with extreme difficulty.

The history of A., under the Moslems, offers few episodes worthy of notice. The Algerines continued to carry on their piratical war against the powers of Christendom, venturing even to land on the Italian and Spanish coasts. Inland, too, they were constantly fighting to extend their territories. Before the end of the 16th c., they had subdued the whole country to the verge of Morocco, with the exception of Oran, which belonged to Spain. The Spaniards were invariably unsuccessful in their attempts at reprisals. Emboldened by success, the Algerines pushed their piratical expeditions even beyond the straits of Gibraltar. In the year 1600, the Turkish janissaries of Algiers obtained from the Constantinopolitan court the right to choose a dey from among themselves, who should share the power with the pasha appointed by the sultan, and be their commander-in-chief. The result of this divided authority was internal strife and confusion. Nevertheless, the insolence of the Algerines at sea increased. They attacked even the coasts of Provence, compelling Louis XIV. to chastise them thrice; which he did, however, with very little effect. An incident occurred during the first bombardment of Algiers by the French fleet in 1682, which illustrates the reckless ferocity of these corsairs. By way of answer to the cannonading of his enemies, the dey caused the French consul, Vacher, to be shot off from the mouth of a mortar! After the third bombardment, in 1687, the dey scornfully inquired of the French how much money the burning of Algiers had cost their master, and on being told, coolly replied that "he would have done it himself for half the sum, and spared their king the trouble." No more decisive result followed the attack of Admiral Blake in 1655, nor of the English and Dutch fleets in 1669 and 1670; yet the English were the first to form treaties with the Algerines. In 1708, the dey, Ibrahim, made himself master of Oran, and his successor, Baba-Ali, succeeded in effecting the virtual emancipation of the country from the dominion of the porte. He banished the Turkish pasha; craftily persuaded the sultan of Turkey to leave the power solely in his hands; carried on war and concluded peace at his own pleasure, and paid no more tribute.

A. was now ruled by a military oligarchy, at the head of which stood the dey, and after him the powerful Turkish militia, recruited from Constantinople and Smyrna, because their children by native mothers could not enjoy the same privileges as themselves. Besides these, there was a divan, or council of state, chosen from the sixty principal civil functionaries. The internal history of the country henceforth presents nothing but a bloody series of seraglio revolutions, caused by the lawless janissaries, who permitted few of the deys to die a natural death. In the year 1775, Spain undertook her last great expedition against A., with 44 ships of war, 340 transports, and 25,000 soldiers. This, however, was as singularly unfortunate as all her previous ones. Everything went wrong, and the Spaniards had to re-embark as speedily as possible, leaving behind them 1800 wounded, and all their artillery. Thus A. continued to defy the greater Christian powers, and to enforce tribute from the lesser. During the French revolution and the time of the empire, its piracies were much diminished in consequence of the presence of powerful fleets in the Mediterranean sea; but at the close of the war they were recommenced as vigorously as ever. This brought down upon "the nation of corsairs" the vengeance of the Christian powers. The Americans took the lead, attacked the Algerine fleet off Carthage, on the 20th June, 1815; defeated it, and compelled the dey to acknowledge the inviolability of the American flag. About the same time, the English admiral, lord Exmouth, extorted from the other states of Barbary the recognition of an international law respecting the treatment of prisoners. A. alone refused to consent to it; and after a delay of six weeks, the English and Dutch fleets, under the command of lord Exmouth, fiercely bombarded the capital. The batteries of the pirates were soon silenced; and in a few hours the half of the city lay in ruins; its naval force and its magazines being all destroyed. The dey, an ignorant and obstinate barbarian, still wished to protract the fight, but his soldiery forced him to yield, and a treaty was concluded (1816), by which all Christian slaves were released without ransom (the number was 1211), and a promise was given that both piracy and Christian slavery should cease forever. But nothing could keep these wretches from piracy. As early as 1817, they ventured as far as the North sea, and seized all ships in their course not belonging to any of the powers who sent them tribute or presents, as was done by Sweden, Denmark, Portugal, Spain, Naples, Tuscany, and Sardinia. Nor did even treaties avail to protect European vessels at all times. The Spanish, the Papal, and in particular the German shipping suffered severely; while the dey mocked by his insolent replies the remonstrances addressed to him.

Meanwhile the internal condition of A. continued to present the spectacle of a cruel

prætorian despotism. In the year 1817, the power of the janissaries was greatly weakened by the skillful tactics of the Dey Ali. Upon his death, which was occasioned by the plague in the following year, Hussein was chosen in his stead, under whom the Moslem dominion was terminated by a conflict with France. The causes of this conflict were various. A French trading brig was plundered in Bona in 1818; the dwelling of the French consul was attacked in 1823; Roman ships, sailing under the protection of the French flag, were seized; and even French ships were detained and plundered. But the chief cause of the quarrel was a dispute about the payment of a debt incurred by the French government to two Jewish merchants of Algiers at the time of the expedition to Egypt. This debt was fixed at seven millions of francs; four and a half millions were immediately paid; the rest was reserved until the counter-claims of certain French creditors should be decided in the French law courts. For three years the lawsuit dragged its slow length along, till the Dey became impatient—being himself a principal creditor of the Jewish-Algerine house—and angrily demanded payment from the king of France. To his letter no answer was returned. The feast of Beiram occurring soon after, when it was customary for the Dey to receive all the consuls publicly, he asked the French consul why his master had remained silent. The latter haughtily replied that “a king of France could not condescend to correspond with a Dey of Algiers.” Upon this, the Dey struck him on the face, and fiercely abused his sovereign. In consequence of this insult, a French squadron was sent to Algiers, which received the consul on board, and blockaded the city, 12th June, 1827. Six days after, the dey caused the French coral-fisheries at Bona to be destroyed. For three years the blockade was listlessly carried on; but in April, 1830, during the ministry of Polignac, a warlike manifesto appeared; and a month later, a fleet sailed for the African coast, consisting of 100 ships of war and 337 transports, having on board an army of 37,000 infantry, 4000 cavalry, and a proportionate number of artillery, under the command of Lt.-gen. Bourmont. The landing was effected under trifling opposition. A perpetual skirmishing then took place previous to the bombardment of Algiers, which commenced on the 4th July. Next day a capitulation was agreed to. The Turkish soldiers marched out—for such were the conditions—with their families and private possessions, and the French took possession of the place. Fifteen hundred guns, 17 ships of war, and 50,000,000 francs fell into their hands as spoil. The Dey retired to Port Mahon, with his private property and a train of 118 persons, while the greater number of the Turkish janissaries were conveyed to Asia Minor. The conduct of the French soldiery, however, it must be confessed, tarnished the glory of their conquest. They went about plundering remorselessly the beautiful villas and gardens in the neighborhood of Algiers, as well as the ancient valuables and works of art; thus exciting a universal spirit of hostility in the natives, who kept up an incessant guerrilla warfare outside the capital.

After the revolution of July, Marshal Bourmont resigned, and Gen. Clausel was appointed his successor. The latter, who was a prompt and vigorous man, set about subduing the country, and giving it a regular government. His predecessor had committed a great mistake in driving out the Turks, who might have been usefully employed in subordinate functions of authority. After their banishment, the Kabyles and Bedouins, believing themselves emancipated from all subjection, and stimulated by intense fanaticism against the new conquerors, rose in rebellion, or rather commenced a series of petty struggles, which obstructed the colonization of A. for many years, and which cannot be said to have altogether ceased even yet. The imposition of French laws and institutions was made not in the wisest spirit, most of the old Turkish regulations being summarily abrogated. Besides this, the natives were wounded in their most susceptible point. Their mosques and burying-grounds were frequently desecrated and destroyed; and Clausel, whose vigor was more remarkable than his justice or prudence, confiscated—in direct contradiction to the very words of the capitulation—all the immovable property of the deys, and other exiled Turks, and of the townships, besides various religious institutions. The effect of these political crimes was instant. The entire provinces determined obstinately to resist; some even of the provincial rulers who had previously submitted, now appeared in arms again. Clausel was compelled to undertake a military expedition against the refractory beys; but his uncertain successes only inflamed the hatred and patriotism of the Kabyles and Arabs, who opposed him energetically. A young emir at last appeared on the scene, Abd-el-Kader (q.v.), who soon became the rallying-point of the *jad* (“holy war”), which the Marabouts had begun to preach. Under these circumstances, it became impossible for Clausel to carry out his scheme of colonization, and only a reckless speculation in land took place, which was in every way injurious. To strengthen his position, the French general, whose army was now greatly reduced, made a treaty with the Bey of Tunis; but the home-government disapproving of it, he was recalled in consequence. His successor, Gen. Berthezène, having achieved nothing but defeat and disgrace in spite of his cruelties, was also speedily recalled, and Lt.-gen. the duke of Rovigo appointed to the command. He arrived in Algiers on the 25th of Dec., 1831, and established a most severe and relentless system. He scrupled not to perpetrate the most arbitrary acts, cruelties, and treacheries. His two most remarkable actions were, first, the complete annihilation of the whole Arab tribe El-Uffia, when even old men, women, and children were massacred during the night, on account of a robbery committed by some of the members of the tribe; second, the exe-

cution of two Arab chiefs who were hostile to him, and whom he had treacherously allured into the city by the written promise of a safe conduct. Such monstrous proceedings fired the entire nation. The most peaceful tribes flew to arms, and the French were attacked on all sides. The emperor of Morocco, who secretly fomented the strife, and even meditated the conquest of Oran, assisted the fierce and impetuous Abd-el-Kader in his designs. The health of the duke now declined. He returned to France in March, 1833, and the administration of affairs was provisionally intrusted to gen. Avizard, who gained some credit by establishing the *bureau Arabe*. After the death of the duke, gen. Voirol, a man exactly the reverse of his predecessor, was made interim commander-in-chief. His efforts were more directed to promote the material interests of the colony, than to extend the power of France. He met with little opposition in the province of Algiers, and in the eastern districts; but, on the other hand, the war raged fiercely in the west, where Abd-el-Kader had either gained over or subdued all the tribes between Mascara and the sea. At length a treaty was effected with him, in which he pledged himself to make peace, and to deliver up all his prisoners. In return, he received a monopoly of the corn-trade, and the right to buy arms and ammunition in the French ports. Towards the end of 1834, the French government, having resolved to retain permanent possession of the colony, organized its administration anew, placing the supreme power, both civil and military, in the hands of a governor-general, who received his orders from the minister of war. Gen. Drouet d'Erlon was the first appointed to this high dignity. Under him there were a commander of the troops, a commander of the naval force, a military intendant, a civil intendant, and a director of finance. The administration of justice was also regulated by the erection of many tribunals. Frenchmen and foreigners were to be subject to French laws, but the natives to their own. Moreover, the old Algerine courts of justice were still to be kept up. D'Erlon apparently desired, at first, to occupy himself with the internal administration of the regency, and, in truth, deserved much credit for the introduction of French municipal institutions, and the French system of education and police arrangements; but a disgraceful defeat suffered by the French army at Makta, on an expedition against Abd-el-Kader, who had secretly broken the treaty, caused the recall both of the officer in command and of D'Erlon himself. Clausel was now sent back to A. with the title of marshal. He arrived on the 10th of August, 1835, his first anxiety being to wipe away the disgrace of the defeat at Makta. About three months after, he marched out at the head of 11,000 men, to attack Mascara, the center of Abd-el-Kader's power: he had to fight many petty battles on his way, but was always successful. On reaching Mascara, he resolved to set it on fire, which he did on the 8th Dec., and then commenced his retreat, in which his army suffered severely from bad weather, and from perpetual harassments by the enemy. Abd-el-Kader was soon more powerful than ever, and Gen. Bugeaud had to be sent out from France with reinforcements; but nothing came of this save a few fruitless victories over Abd-el-Kader, which did the latter no real harm. Bugeaud was at length compelled to make peace on the 30th May, 1837. Abd-el-Kader recognized the sovereignty of France over the regency: he received, in return, the government of the provinces of Oran, Titeri, and Algiers, with the exception of the cities of Oran, Arzeu, Masagran, Mostaganem, Algiers, Blidah and Koleah, Sahel (or the "sea-coast"), and the plain of Metidja. In exchange for the city of Tlemzen, he delivered to the French army 60,000 sacks of corn, and 5000 oxen: he was likewise permitted to buy arms and ammunition in France. In Feb., 1837, Marshal Clausel was recalled, and Lt.-gen. Damrémont succeeded him. The condition of the colony was at this moment desperate, for the disgraces which followed the rash and even reckless measures of Clausel had everywhere lowered the *prestige* of the French army. The duty of the new governor-general was clear, but difficult: he had to wipe out the stain which attached to the honor of his soldiery, and to re-create the conviction of their superiority. He first attacked the Kabyles of the province of Algiers, and chastised them with considerable severity, and then commenced his great work of taking Constantine, from which his predecessor had been compelled ignominiously to retire. In the month of May, with an army of 12,000 disciplined troops, besides *Zuavi* (originally light infantry raised among the natives), *bataillons d'Afrique* (convict-battalions at first), the *tirailleurs d'Afrique*, and the *chasseurs d'Afrique*, as well as the Spahis (a cavalry corps composed of native soldiers commanded by French officers), Damrémont marched to the attack of Constantine, and, in spite of fearful weather, succeeded in storming the city on the 13th. This victory laid the foundation for the entire subjugation of the province of Constantine, which was completed in the course of the two following years without any great effort.

On Dec. 1, 1837, Gen. Valée was appointed governor-general in the stead of Damrémont, who had fallen at the storming of Constantine. He, like the others, misunderstood the character of Abd-el-Kader when he considered it possible for him to remain quiet. New treaties were made, which only delayed hostilities. Meanwhile, the work of colonization went on in spite of numerous obstacles. The province of Constantine was much improved by the building of towns and the making of roads; but suddenly, in Oct., 1839, Abd-el-Kader, whose power had now become formidable to an unprecedented extent, violated the treaty on an insignificant pretext, and fell upon the unprepared French with an overwhelming force. The European settlements in the open plain were attacked and laid waste, bodies of French troops were surprised on their

march and cut to pieces, small outposts and encampments were taken in a moment, and by the 24th of Nov. the dominion of the French was confined to the fortified cities and camps. Even the settlements in the plain of Metidja were lost. Forty thousand Arabs swept over it, and threatened Algiers itself. This state of things demanded energetic measures. The spring campaign was vigorously opened on both sides: everywhere the French gained splendid successes; while the heroic defense of the fort of Masagran, near Mostaganem (garrisoned by only 123 men), against from 12,000 to 15,000 Arabs, who stormed it incessantly, and with the utmost fury, for three days, raised the *prestige* of the invaders higher than ever. Still, however, nothing was really accomplished. After repeated bloody defeats, the native tribes again rushed to arms, swept the plains, and rendered life insecure at the very gates of Algiers. The only thing of any practical importance which took place during the whole year was the beginning of the circumvallation by which the fertile plain of Metidja was to be secured against the hostile incursions of the Arabs. Marshal Valée was now recalled, and Lt.-gen. Bugeaud appointed his successor. The latter arrived at Algiers on Feb. 22, 1841, and adopted a new system, which was completely successful. A brave, inexorable, and unscrupulous man, he resolved to employ any and every means for the attainment of his purpose. He wearied out the enemy by incessant *razzias* (predatory excursions) against individual tribes, corrupted them (not a difficult thing to do) by all the arts of bribery, and on special occasions undertook great expeditions to annihilate the regular power of Abd-el-Kader, whose strong defensive positions he destroyed, and whose authority he spared no pains to undermine. The French army was raised to 80,000 or 100,000 men. Its operations were carried on from three principal points. Victory followed Bugeaud wherever he went. He relieved and victualled hard-pressed garrisons; intimidated the surrounding country; penetrated to Tekedempt—the very stronghold of Abd-el-Kader himself—which he laid in ashes; marched thence to Mascara, which was also taken; and on all sides received the submission of the terrified Arabs. Even the hottest period of the summer was made use of. Bugeaud bribed and seduced from their allegiance those Arabs who were under the sway of Abd-el-Kader. The autumn campaign was for the time decisive. Saïda, the last fortress belonging to the gallant emir, was utterly destroyed, and now almost the entire country was subdued. Abd-el-Kader retired into Morocco, where he raised a new army, for his old one had been completely annihilated. He was, however, defeated by Gen. Bedeau, and again compelled to retreat into Morocco, from which, however, he issued a second time, in the summer of 1842, and contrived to maintain a fierce but desultory warfare, for two or three years, aided by the sultan of Morocco. At last, however, deserted by most of his followers, pursued by his late ally, and, in fact, hemmed in on all sides, he was forced to surrender to Gen. Lamoricière, at the close of Dec., 1847. See ABD-EL-KADER.

The revolution of Feb., 1848, somewhat disturbed the progress of conquest and subjugation in A. That superb race of mountaineers, the Kabyles, descendants of the ancient Numidians, and possessed of the same fiery and dauntless spirit, broke out into a new insurrection, which, however, was speedily quelled. The national assembly now offered to the European population of A. to incorporate the country with the republic of France, and to grant it all the accompanying political privileges of a French province; but intelligent men of all parties acknowledged the uselessness and danger of this step. It was, therefore, simply declared to be a permanent possession of the republic. Four deputies from the colony were permitted to take a part in all discussions in the national assembly on Algerian affairs. Meanwhile, the work of conquest, colonization, and, in some respects, civilization went on. The French troops penetrated into the far south, almost to the borders of Sahara, sternly reducing to obedience the desert tribes, who manifested a not unnatural antipathy to these inroads, and in some cases fiercely resisted the invaders. Various tribes of the Kabyles, too, opposed every attempt at organized taxation, and the imposition of civilized discipline; the result of which patriotic obstinacy was, a new campaign against them by the French Gen. Bugia. Fortune again declared for the invaders; but the most alarming insurrection was that excited by the Cherif Bou-zian, who fled for freedom to Zaatcha in the oases. The French pursued him thither; but were beaten, and had to retreat. Some months after, they returned largely reinforced, and in spite of the broad belt of palm-trees which hindered their operations, and the wild and strenuous heroism of the besieged, the place was stormed and destroyed. The defenders all perished.

In 1853-54, and again in 1856-57, expeditions were organized against the Kabyles, though not altogether with the will of the colonists, who could not but recognize the great intelligence and industry displayed by that highland race. The struggle was sanguinary and barbarous on both sides, but the French at last subdued their enemies. For two years (1858-60) the military government of A. was superseded by the institution of a special ministerial department for A. and the colonies, which was first of all intrusted to Prince Napoleon. In Dec., 1860, however, a military government was re-instituted, and Marshal Pelissier made governor-general, with a vice-governor under him, a director-general for civil affairs, and a council of thirty members. In 1863, the Emperor Napoleon announced that he was willing to give the colony a new constitution, with a chamber of representatives for provincial affairs; he also addressed a letter to

the governor-general, in which he explained that A. was no colony in the strict sense of the word, but an Arabian kingdom; and that the natives had the same right to protection as the colonists. In 1864, however, strife again arose between the colonists and the Arabs; and it was only after several engagements, during the months of April and May, that peace was restored by the submission of the conquered tribes. Péliissier having died in May, 1864, Marshal MacMahon was appointed to succeed him. In the following year, the emperor himself made a journey to A., and, on March 5 issued a proclamation, in which, although explaining to the Arabs that A. must continue to be united to France, he promised to maintain their nationality, and at the same time gave them assurance that they should always remain in undisturbed possession of their territories. Yet these and other measures for conciliating the Arabs were all in vain; for, shortly after the emperor's return to France, insurrections broke out in the province of Oran and elsewhere. Si-Hamed, a native chief, with 12,000 horsemen at his command, began to harass those tribes which remained in submission, until he was routed by col. Colomb of Geryville, and forced to escape into Sahara: after which, in the beginning of 1867, two expeditions, led by Colomb and Souis, succeeding in reducing to submission the other tribes which had revolted. In 1867 and 1868, a severe and general famine checked the military enterprises of the Arabs; and there was peace till 1870, when, the Franco-Prussian war having begun, the emperor found it necessary to withdraw to Europe the greater part of the forces in Africa. MacMahon's place was then taken by Gen. Durieu, as interim governor-general; and the natives began to entertain hopes of freeing themselves from the yoke of France. Movements were begun in the provinces of Constantine and Oran, which it required all gen. Durieu's vigilance and activity to hold in check. After this, again, some disorder arose among the colonists themselves, who strongly desired the abolition of the military government—a change which the new republican government at Paris soon gratified them by effecting. To Durieu's place was appointed a civil governor, and under him prefects for each of the three provinces. A council was formed—composed of the prefects, archbishop, commander of the army, and other members appointed by the French government—with which, in all important cases, the governor has to take counsel. The territory of the Sahara and adjoining districts remain exclusively under military rule.

The French troops still stationed in A. consist of one "corps d'armée, and a territorial army reserve of Zouaves, cavalry, and artillery. It is said that the possession of A. has cost France the lives of 150,000 men, besides \$600,000,000 in money. The revenue of A. is derived chiefly from indirect taxes, licenses, and customs duties on imports. In 1896 it was about 53 million francs a year, and the expenditure about 74 million. The cost of maintaining the army, however, is not included in the expenditure, being provided out of the French budget.

Since the subjugation of A., the French have conferred various benefits on the colonists and native tribes, not the least important of which has been the digging of Artesian wells (q. v.). In May, 1856, a "boring" was commenced in an oasis of the Sahara or desert of the province of Constantine. A civil engineer, a sergeant of Spahis, and a detachment of soldiers of the foreign legion, succeeded in bringing to light a splendid fountain or river, yielding not less than 4010 quarts of water per minute. The work was considered a miracle. From all quarters the Arabs flocked to behold and enjoy it. The native priests blessed it, naming it the "Fountain of Peace." Another well was termed the "Fountain of Benediction." In the oasis of Sidi-Rached, unproductive for want of water, a well was dug, and a depth of 54 mètres yielded 4300 quarts per minute. It is known as the "Fountain of Gratitude," and the enthusiasm excited at its opening was boundless. The idea of providing such wells has rightly been considered "a stroke of strong political wisdom."

The government has done service to the colonists by encouraging the formation of banking-companies, etc. In 1895 there were about 1961 m. of railway in operation, including the lines into Tunis, from Algiers to Oran, from the sea to Constantine and Setif and from Bona to the mines of Ain Mokra. A telegraph cable was laid in 1870 between Bona and Marseilles. In 1894, 3602 vessels of 2,164,628 tons entered Algerian ports.

It would be too much to affirm that the colonization of A. has advanced rapidly. The French government has acted neither very promptly nor very liberally towards settlers; and the number of formalities which require to be gone through before one can properly secure the land which he has purchased, often disgusts the poor farmer. However, great efforts have been made for the improvement of agriculture. The population engaged in agriculture in 1894 was 3,481,285, of whom 201,541 were Europeans. The total exports of A. amounted (1894) to over \$48,000,000; the imports to about \$52,000,000. In 1894, £310,822 worth of alfa fibre or esparto and other fibres for making paper were exported to Great Britain. A number of Mohammedan schools for instruction in French and Arabic have been established, and are regularly attended by pupils of both sexes, who learn to read and write fluently in the French language, and to keep accounts. In Algiers itself there are several of these schools, where female children are taught sewing. Thus, although progress is slower than might have been anticipated, it is real, and its pace accelerating. When fierce memories have been softened by time, and such atrocious

ties as those of Dahra (q.v.) have been forgotten in the substantial blessings which an enlightened civilization cannot fail to bestow, the presence of the French in A. will cease to be deplored by the natives. Being anxious to secure land in Algeria, and promote colonization among Europeans, the government appropriated lands belonging to nomadic tribes and Kabyles. This action was severely censured, as a breach of the settlement of 1830, which agreed to the protection of all Mohammedans, in regard to both property and religion. It is not the intention of the government to refuse compensation for the lands or to reduce the necessary amount of pasturage required by the sheep-growing tribes.

The country is divided officially into civil territory and military territory, and there are three divisions of each. Pop. in 1891:

Territories.	Sq. Miles.	Civil Districts.	Military Districts.
Algiers	65,929	1,275,650	192,477
Oran	44,616	817,450	124,616
Constantine	73,929	1,543,867	170,672
Total	184,474	3,636,967	487,765

ALGHER'O, or **ALGHERI**, a sea-port on the w. coast of the island of Sardinia, 15 m. s.w. from Sassari. It is well defended towards the sea, being built on a rocky point, and surrounded by thick walls, but is commanded by some hills which overhang the town. A. has a cathedral, several convents, a college, and public schools. It exports wine, tobacco, anchovies, skins, coral, bones, etc. It was a favorite residence of Charles V., in whose time it belonged to Spain. Pop. 10,000.

ALGIERS' (Arabic, Al-jezira, the island), the capital of Algeria, was built about 935 A.D. by an Arab chief. It rises from the sea-shore up the sides of a precipitous hill in the form of an equilateral triangle. The apex is formed by the Casbah, the ancient fortress of the deys, which is 500 ft. above the sea-level, and commands the whole town. The base is a mile in length. The present city may be regarded as divided into two parts: the old, or high town; and the new, or low town. With the exception of some mosques, the latter consists of wharfs, warehouses, government houses, squares, and streets, principally built and inhabited by the French, while the former is almost wholly Moorish both in its edifices and inhabitants. The great center of bustle and activity in A. is the Place Royale—a large oblong space in the center of the town, planted with orange and lime trees, and surrounded by houses in the European style. Here may be found as motley a crowd as anywhere in the world, denizens of all nations—Arabs, Moors, Jews, French, Spaniards, Maltese, Germans, Italians, etc. The city is intersected by two large parallel streets, Bab-el-Ouad and Bab-azoun, running n. and s. for more than half a mile. They are flanked by colonnades, but are very narrow, and therefore inconvenient for traffic; as promenades, however, nothing could be more agreeable. In 1833, A. had upwards of 100 mosques and marabouts. The mosques are divided into two classes—the djamas, or principal mosques, and the mesjids, or inferior mosques. The marabouts are the tombs and sanctuaries of saints. Everywhere A. wears the aspect of a rising colonial city. Other towns in the province still retain their oriental character, with the exception of a few military buildings; but the new town of A. might deceive the traveler into the belief that he is still in Europe, were it not for the throng of swarthy faces he meets. The streets are regular, spacious, and elegant; some of them as handsome as the Parisian boulevards, and adorned with arcades. The shops, too, are occasionally very good. The houses are in some instances five stories high, which, though it gives a massive and imposing appearance to the city, is yet a very perilous innovation in a place which has suffered dreadfully from earthquakes.

But perhaps greater interest attaches to the old Moorish town, which is connected with the new by a steep, narrow, jagged-looking street called the Casbah, leading down from the fortress of the deys. The houses are square, substantial, flat-roofed; rise irregularly one over the other, and have no windows, but only peep-holes, which are intended to exclude impertinent eyes, and are therefore fortified with iron gratings instead of glass, so that the houses have a very prison-like appearance. Although the streets at first contrast unfavorably with those of Europe, on account of their narrowness, the coolness which this secures soon reconciles the traveler to other inconveniences. The inhabitants have recourse to their flat roofs or terraces in the evening, to enjoy the delicious sea-breeze. The French have introduced many useful reforms. There are conduits in every part of the city, public baths, coffee-houses, hotels, omnibuses, etc. The markets are held in the squares de Chartres, Mahon, and d'Isly. Horse-racing is the great amusement. The Arabs are passionately fond of it. The French have also improved, at great expense and labor, the port, which was in a precarious condition. The town has supreme courts of justice, a chamber and tribunal of commerce, a college and schools, a Catholic cathedral and several churches, a French Protestant church, a synagogue, a bazaar for the exhibition of native industry, theaters, and banks.

A., which had been wretchedly misgoverned by a long succession of Turkish deys, fell into the hands of the French in 1830 (see ALGERIA), who swept away every trace of the ferocious despotism that had prevailed. The Turks withdrew in great numbers to Tunis and Alexandria. Pop. in '91, 82,585; of which about a third was French.

ALGIERS, a former village of Orleans parish, La., opposite the city of New Orleans on the s. bank of the Mississippi; now a part of New Orleans, with which it is connected by ferry.

ALGO'A BAY, an extensive inlet at the e. extremity of the s. coast of Africa, being intersected by the parallel of Cape Town, from which it is distant about 8 degrees of longitude. Its anchorage is sheltered, excepting on the s.e., the holding-ground being excellent. It receives two rivers, the Sunday and the Baasher. At the mouth of the latter is Port Elizabeth. A. B. is the harbor of the eastern province, by far the most flourishing section of the colony; and it will ever be locally memorable as the landing-place of about 4000 souls in 1820, the first British emigration to this once Dutch possession. Since then, the trade of the bay has steadily and rapidly increased. See further, **CAPE OF GOOD HOPE**.

AL'GOL, a remarkable variable star in the constellation Perseus. It continues of the second magnitude for about 62 hours, then in three and a half hours it dwindles to the fourth magnitude, remains so for about 20 minutes, and in three and a half hours more gradually returns to its greatest brilliance, its variations being completed in about 69 hours.

ALGO'MA, a n.w. district of the province of Ontario, on lakes Huron and Superior; famous for mines of silver, copper, tin, iron, and for abundance of lumber. Pop. in 1891, 41,856; chief t., Sault Ste. Marie.

ALGONQUINS. The A. formed the most prominent of the three aboriginal races that the French found in the great basin of the St. Lawrence. They were then the lords not merely of the best part of Canada, but of much adjacent territory to the n. and w. At the present day, the A. as well as the Hurons and Iroquois, exist, at least within the pale of settlement, only as the shadow of a mighty name, being chiefly confined to several miserable villages, with hardly anything of civilization but its individual helplessness. This deplorable result, from whatever causes it may have arisen, is certainly not to be imputed either to oppression or to indifference on the part of the French, who, politically, religiously, and socially, have always treated the red man with consideration and humanity. On this interesting subject, see further under the general head of **AMERICA**.

ALGUACIL, or **ALGUAZIL** (derived from the Arabic *Wasil*, i.e., the "power" derived from the king), is the general name in Spain of the officers intrusted with the execution of justice. There are "Alguaciles mayores," who either inherit the office of executing justice in a town as a hereditary right belonging to their families, or are chosen to the office by the municipality; formerly, the name was also given to the officers that executed the sentences or orders of tribunals, such as the tribunal of the Inquisition, and of the various orders of knights. But usually, under the name of A. is understood the "Alguaciles menores," or "ordinarios," that is to say, the attendants or officers of the courts of justice, gens-d'armes, bailiffs—in short, all the inferior officers of justice and police.

ALHA'GI. See **MANNA**.

ALHA MA (Arab. *The Bath*; the Roman *Astigia Juliensis*), a t. of Andalusia, Spain, in the province of Granada, 25 m. s.w. from Granada. Its situation is extremely picturesque, on the edge of a projecting rock, overhanging a deep chasm of limestone hills, through which the river Marchan foams, and with mountains in the background rising to a height of 8000 ft. Vineyards and gardens mingled with the houses on the steep slopes add to the interest of the scene. A. is a decayed t., although its warm sulphureous baths are still frequented by visitors in the beginning and end of summer. The Moors derived a large revenue from its baths. It was a famous fortress of the Moors; and its capture, in 1482, prepared the way for that of Granada. There are still remains of the Moorish castle and town wall. There are ruins also of a Roman aqueduct: the principal bath still in use is a Moorish edifice; and a smaller one is supposed to be Roman. It was visited by an earthquake in 1884. Pop. 7758.

ALHAMA, a t. of Murcia, Spain, 19 m. s.w. from Murcia. It is celebrated for its warm mineral waters, and is resorted to for bathing. It has a ruined castle. Pop. 7000.

ALHAM'BRA is the name given to the fortress which forms a sort of acropolis or citadel to the city of Granada, and in which stood the palace of the ancient Moorish kings of Granada. The name is a corruption of the Arabic *Kal'-at al hamra*, "the red castle." It is surrounded by a strong wall, more than a mile in circuit, and studded with towers. The towers on the n. wall, which is defended by nature, were used as residences connected with the palace. One of them contains the famous *Hall of the Ambassadors*. The famous *Hall of the Abencerrages*, the most beautiful in the palace, was the scene of the massacre of the Abencerrages (q. v.). The remains of the Moorish palace are called by the Spaniards the Casa Real. It was begun by Ibnu-l-ahmar, and continued by his successors, 1248-1348. The portions still standing are ranged round two oblong courts, one called the *Court of the Fishpond*, the other the *Court of the Lions*. They consist of porticoes, pillared halls, cool chambers, small gardens, fountains, mosaic pavements, etc. The lightness and elegance of the columns and arches, and the richness of the ornamentation, are unsurpassed. The coloring is but little altered by time. The most characteristic parts of the Casa Real have been reproduced in the "Alhambra

Court" of the Crystal Palace at Sydenham. A great part of the ancient palace was removed to make way for the palace begun by Charles V., but never finished. The palace was partially restored by Isabella in 1862, but was damaged by fire in 1890. See *illus.*, SPAIN, vol. XIII., ARCHITECTURE, vol. I., fig. 6.

ALHAURIN'EL GRAN'DE, a t. of Granada, Spain, in the province of Malaga, and 19 m. w. from Malaga, on the n. side of the Sierra de Mijas, and near the Faala, an affluent of the Guadalhorce. It is a well-built t., with a number of squares, wide, well-paved streets, and many fountains. There are remains of a Roman aqueduct and of an Arab fortification. Many of the inhabitants are employed in quarries and mines. Pop. 8400.

ALHA'ZEN, or **ABU ALI AL-HASAN IBN AL-HASAN**, d. 1038: a mathematician. He declared that he could construct a machine that would regulate the inundations of the Nile, but when the caliph directed him to make it he feigned madness. A. made valuable discoveries in optics, and it was he and not Ptolemy who explained why planets appear largest when near the horizon. He also taught, in advance of Vitello, that vision does not result from the emission of rays from the eye.

ALHON'DEGA, a fortified granary near Guanajuato, Mexico, where, in 1810, in the beginning of the revolution against Spain, the commander of the city of Mexico took refuge and was captured after severe fighting by the insurgents under Hidalgo. About 2000 were slain in the city, a single family losing 17 members; and all their houses were destroyed. When the Spaniards in the granary had exhausted their stock of cannon balls, they used quicksilver flasks—some say bags of silver dollars, also—which did terrible execution.

AL'IA, a t. of Sicily, in the province of Palermo, 30 m. s.e. from Palermo, picturesquely situated on the crest of a hill, in a mountainous and craggy district, near a torrent called the Fiume Torto. Pop. 5000.

A'LIAS, at "another time," or by "another name;" as Jones *alias* Smith; i.e., he calls himself by either name. An "A. writ" is one issued where one of the same kind has issued before in the same cause.

ALIBAUD, LOUIS, 1810-36, notorious for his attempt to murder King Louis-Philippe, was, at the revolution of July, quarter-master in the 15th regiment of the line. Having been degraded subsequently for an accidental brawl in the streets of Strasbourg, he demanded his discharge in 1834, and went to live at Perpignan, and then at Barcelona, where, having become a fanatical republican, he returned to Paris, with the determination to murder the king. A weariness of life had also seized him, so great, that he thought of suicide. It was on the 25th of June, 1836, at the moment that the king, when driving through the gate of the Tuileries, bowed to the national guard as they presented arms, that A. fired the well-aimed ball, which passed close by the king's head. Being immediately seized, he regretted nothing but the failure of his attempt. After a short trial he was sentenced to death, and was guillotined on the 11th of July.

ALI-BEN-ABI-TA'LEB, the first convert to Mohammedanism, and fourth caliph, was the bravest and most faithful follower of the prophet, whose daughter, Fatima, he married. Being made caliph in the place of the murdered Othman, he was victorious over the rebels in ninety engagements. He took prisoner Ayesha, the young widow of Mohammed, and his greatest enemy, in the battle of the Camel—so called because Ayesha appeared in the field riding on a camel. Ali was murdered by a fanatic in the year 660. He was buried near Kufa, where a monument was afterwards erected to him, to which his votaries still go on pilgrimage, and which caused the building of the city Medjed Ali. The religious sect formed by the followers of Ali, called Shiites (q.v.), has spread extensively under that name in Persia and Tartary. The descendants of Ali and Fatima, called the Fatimides (q.v.), although much persecuted by the Omniades, have nevertheless ruled on the banks of the Nile and of the Tagus, in West Africa and in Syria. The best edition of the proverbs or maxims ascribed to Ali has been published by Fleischer (Ali's *Hundred Proverbs, Arabian and Persian*, Leip. 1837); Ali's *Divan*, the most complete collection of his lyrical poems, mostly on religious subjects, appeared in 1840 at Bulak, near Cairo.

ALIBERT, JEAN LOUIS, 1766-1837; physician to Louis XVIII. and author of *Description of Diseases of the Skin*, and other useful works.

A'LI-BEY, 1728-73; a native of the Caucasus, and a slave when a boy. He rose to be governor of the province; intrigued for more power, but voluntarily fled from Eysin to upper Egypt. In 1766, he returned to Cairo, and, seizing the government, freed himself from the power of the sultan, coined money, and assumed the rank of sultan of Egypt. Soon afterwards he captured and plundered Mecca, and undertook to conquer all Syria. At Damascus, June 6, 1771, he routed the Turks with great slaughter and took possession of the city through his general, Mohammed; but the latter turned against him and drove him from Cairo, when A. fled to Syria, defeated the Turkish army, and captured Sidon and Jaffa. On the way to Egypt he was attacked in the desert by Murad Bey, his wife's lover and made prisoner, dying soon afterwards from wounds or poison.

ALIBI, Lat., signifying "elsewhere." This is a defense resorted to in criminal prosecutions, when the party accused, in order to prove that he could not have committed the crime with which he is charged, tenders evidence to the effect that he was in a different place at the time the offense was committed. When true, there can be no better proof of innocence; but as offering the readiest and most obvious opportunity for false evidence, it is always regarded with suspicion. In the case of crimes the place of committing which is immaterial—as, for example, the act of fabricating the plates, or of throwing off the spurious notes, in a case of forgery—a proof of A. is of no avail.

ALICANTE, chief t. of a province of the same name in Spain. The province, formed of parts of the old kingdoms of Valencia and Murcia, contained, '87, 439,638 inhabitants. The t., one of the most considerable seaports of Spain, is strongly fortified, has 33,050 inhabitants, and is the staple place for the products of Valencia, especially soda, cotton and linen fabrics, ropes, corn, oil, silk, and the wine of the neighboring district, known as A. or *vino tinto*, on account of its dark color. A good deal of this rough, and at the same time sweet, wine is used to doctor thin clarets for the British market. In 1331 the t. was besieged by the Moors; and again by the French under Asfeld in 1709. In 1873, it was unsuccessfully bombarded by the Cartagena insurgents.

ALICATA or **LICATA**, a t. of Sicily, in the province of Girgenti, and 26 m. s.e. from Girgenti. It is most beautifully situated on the sea-coast, at the mouth of the Salsa (anc. *Himera Meridionalis*), one of the largest rivers, if not the largest, in Sicily; its buildings stretch along the shore, and occupy the steep slope of the hill, which is crested by the great old fortress, now indeed of little strength, but of imposing appearance. On the brow of a hill to the w. of the town is the dismantled castle of St. Angelo, said to occupy the site of that in which the tyrant Phalaris kept the brazen bull, his celebrated instrument of torture. A. itself is generally believed to stand on the spot where the ancient *Phintias* was built (280 B.C.) by Phintias, tyrant of Agrigentum, after he had destroyed Gela, the inhabitants of which he transferred hither. The place and immediate neighborhood were the scene of some memorable battles in the wars between the Carthaginians and Sicilians, and between the Carthaginians and Romans. In the middle ages A. suffered severely from the depredations of Barbary corsairs. It has a very bad port, the sea being so shallow that only vessels of small size can approach the town; larger vessels are compelled to anchor about a mile from the town, and are loaded and unloaded by the aid of small craft. Yet A. has a considerable trade, exporting corn, macaroni, fruit, almonds, pistachio nuts, sulphur, soda, and wines. Pop. 17,600.

ALICE MAUD MARY, Princess, 1843-78; second daughter of Queen Victoria, princess of England, grand duchess of Hesse-Darmstadt. She was the best known and most beloved of all the queen's daughters, and became especially dear to the English during her father's fatal illness, when her name became "synonymous with a father's farewell and a mother's consolation." She was married to Prince Ludwig of Hesse-Darmstadt, July 1, 1862. The young couple remained a year or more in England, and their eldest daughter, Princess Victoria, was born in Windsor Castle. Her married life was happy, and promised to be as fruitful as that of her mother, for at her death she left five daughters and two sons, but of the last two only the eldest is living, the other having been accidentally killed by falling from a window in May, 1873. The youngest girl died of diphtheria a few days before the mother, whose death was occasioned by the same disease. Princess A. was active in hospital work during the Franco-German war: was a constant visitor at the Alice Hospital, in Darmstadt, and presided over the "Alice Frauenverein," an association of women for charitable purposes. She was zealous in many reform movements, and was a generous patron of literature and education. Her only son was sent to a kindergarten for education, and she positively stipulated that no distinction whatever was to be made or permitted between him and the other pupils. She died on the anniversary of the death of her father. See her *Letters*, with memoir (1884).

ALIEN. In the United States, an alien is a person born out of the national jurisdiction of the country, who has not been made a citizen according to law. Children of U. S. ministers, born abroad, are citizens; so are children born abroad whose father has been a citizen and resident of the United States; so are children of American parents born at sea on vessels under the flag. An A. is not subject to military or jury duty; nor, though naturalized, can he be president or vice-president of the United States. With regard to the two usual modes of acquiring property, by purchase, and by descent, an A. may acquire title by purchase, conveyance, or devise; and may hold, in the absence of restraining statutes, subject to an inquiry by the state; then if he be found legally an A., the land may be adjudged to the state. But such confiscation is rare, the occasions being generally met by special acts of legislature authorizing by his name "an alien to hold," etc. An A. can convey no better title than he possesses. In case of descent, no title passes and no inquest is necessary; so a citizen's brother may inherit from a brother though their father was an A. The drift of statutes, and especially of late legislation, is liberal towards aliens. In most states an intention to become a citizen puts the A. almost on the plane with a citizen. In taking, holding, and disposing of personal property there is no difference between the rights of an A. and of a citizen. But laws of congress prevent an A. from procuring copyrights. An A. enemy

cannot make a legal contract with a citizen ; such contract is unlawful from its inception ; but an A. friend, resident or not, may sustain an action in our courts for invasions of personal or property rights. The act of 1798 authorizes the removal of the aliens of a country with which we may be at war; and, on the commencement of a war, the A. of the enemy loses his status in courts, and his property can be confiscated; but these statutes have never been enforced. There was once a custom of having a jury half of aliens when an A. was party to a suit, but that custom is disused.

ALIGARH. See ALLYGURH.

ALIGNMENT, a term used in military tactics, equivalent to "in line." Thus the A. of a battalion is effected when the men are drawn up in line; the A. of a camp is a rectilinear arrangement of the tents, according to some rearranged plan.

ALIMENTARY CANAL, in mammalia, is that portion of the digestive apparatus through which the food passes after mastication. It is lined by a mucous membrane, which extends from the lips to the anus, being modified in each region. See **MUCOUS MEMBRANE**. The A. C. really begins at the back of the mouth, in the lower part of the bag called the pharynx, which communicates with the nostrils above, and the gullet or œsophagus below, and also with the mouth and the larynx. The pharynx is surrounded by three muscles, the constrictors, which grasp the food, and force it into the next portion of the A. C., the œsophagus. This is a tube composed of an outer layer of longitudinal muscular fibers, and an inner of circular, which extend down to, and spread out upon the stomach. These fibers, by a series of peristaltic contractions, carry the morsel of food along into the stomach. In vomiting, there is a reversal of these actions, which ruminating animals can accomplish at will. The œsophagus passes through an opening in the diaphragm, and joins the stomach, which is a pouch curved with the concavity upwards, expanded into a *cul de sac* on the left side (the cardiac extremity), and gradually narrowed to the right or pyloric end. It consists of muscular fibers continuous with those of the œsophagus, which become thicker towards the pylorus. Its external surfaces are covered by peritoneum, and it is lined by a thick soft mucous membrane, which, when the stomach is empty, lies in folds. Between the muscular and mucous layers is a fibrous layer, in which the blood-vessels lie before they pass into the mucous layer. See **STOMACH**. At its pyloric or left extremity the stomach communicates with the small intestine, which is about 20 ft. in length, becoming gradually narrow towards its lower end, and arranged in numerous convolutions, which occupy the middle of the abdominal cavity, and are kept in position by the peritoneum, which attaches them to the back of the abdomen.

The small intestine is subdivided into three parts. The first, 10 inches from the stomach, is the duodenum, into which open the duct of the pancreas and the common bile duct; of the remainder, the *jejunum* includes about two fifths, and the *ileum*, three fifths. The differences between these last two are not visible externally, but consist in modifications of their internal structure. The tube consists of peritoneum, longitudinal and circular muscular fibers, a fibrous layer, and a mucous membrane. See **INTESTINES**, **SMALL**.

The ileum ends at the right iliac region in the large intestine, which is from 5 to 6 ft. in length. It begins at the pouch called the blind gut (*caput cæcum coli*) or *cul de sac* (see **CÆCUM**), which has a small worm-like appendage (*appendix vermiformis*); a double valve guards the opening of the small into the large intestine. The colon passes upwards on the right side to below the liver (ascending colon), then crosses from the right hypochondrium across the upper umbilical to the left hypochondrium (transverse colon), then descends to the left iliac fossa (descending colon), when it bends twice like an S (sigmoid flexure), and then joins the *rectum* at the left margin of the true pelvis. The colon is distinguished by its pouched or sacculated appearance, the sacs being separated by three flat bands of longitudinal muscular fibers. The peritoneum only covers it in parts. See **COLON**. The rectum is not sacculated, but its muscular coat becomes much thicker; at its lower end the longitudinal fibers stop, but the muscular become more numerous, forming the internal sphincter muscle. The rectum is not straight, but takes a curved course.

The A. C. thus consists of a continuous passage lined by mucous membrane, which rests on a fibrous and muscular basement. Its length is generally about five or six times the length of the body, or, in other words, about 30 ft. It begins below the base of the skull and passes through the thorax, abdomen, and pelvis, and consists shortly of the mouth, pharynx, œsophagus, stomach, small intestine, and large intestine. The above is the description of the A. C. in human anatomy; its parts are variously modified in different animals, as will be found in the articles on its several subdivisions.

ALIMONY signifies, in American law, the allowance which a married woman is entitled to receive out of her husband's estate, on separation or divorce *a mensâ et thoro*. It is generally proportioned to the rank and quality of the parties. Where the wife elopes and lives with an adulterer, the law allows her no A. By Scotch legal writers the term is sometimes used as synonymous with *aliment*.

In the United States jurisdiction with regard to alimony is conferred in general on courts of equity. A. is of two sorts, *pendente lite*, and permanent. The object of the first is to enable a wife to carry on litigation with her husband, by securing her support during the pendency of suits. Should she have sufficient means of her own, no allowance would be made; the amount is fixed at the discretion of the court, and may be changed by the same authority. Permanent A. is a periodical allowance from a husband decreed to a wife as the result of litigation in her favor. If the result be against her, no allowance is made. The amount varies with the means or position of the husband, but is usually from a third to one half of his income, and is subject to change from time to time as the court finds circumstances to warrant. The court can prevent a husband from leaving the state if he means thereby to avoid payment; or the wife can enforce her claim in the federal courts, if the two are citizens of different states. In some states A. becomes a lien on the husband's real estate; or the court may compel him to give security for its prompt payment; or, in proper cases, the husband may be restrained by injunction from so disposing of his property as to place it beyond the reach of the court.

ALI PASHA, one of the most ferocious and unscrupulous men that even the east has produced, was descended from an Albanian pasha, who perished at the siege of Corfu in 1716. He was b. at Tepelen, a small place at the foot of the Klissoura mountains, in Albania, in 1741. His mother was a vindictive and merciless woman, who never hesitated to employ the most revolting means of accomplishing her purposes. Having lost his father, a comparatively quiet and enlightened man, his education necessarily devolved upon her; and she did not fail to inspire him with the same remorseless sentiments that animated herself. His youth was passed in extreme peril and hardship, for the neighboring pashas combining, had robbed his father of nearly all his possessions, in the effort to recover which, young Ali was repeatedly defeated, and at last had to betake himself to the mountains, and even to pledge his sword to save himself from dying of hunger. These calamities were not calculated to soften the native ferocity of his disposition; they only nurtured a mingled boldness and cunning, which afterwards developed itself in a variety of qualities, such as subtlety, dissimulation, foresight, treachery, vigor, and diabolical cruelty. It is said that the change in his fortune arose from his having accidentally discovered a chest of gold, with which he raised an army of 2000 men, gained his first victory and entered Tepelen in triumph. On the very day of his return, he murdered his brother; and then imprisoned his mother in the harem on the charge of poisoning him, where she soon after died. He next reconciled himself to the porte by helping to subdue the rebellious vizier of Scutari; and thus acquired not only the lands that had been wrested from his father, but likewise several Greek cities. He also attacked and slew (with the permission of the sultan) Selim, pasha of Delvino, and, as a reward, was appointed lieutenant to the new pasha of Derwend; but instead of attending to the security of the high-roads (which was his office), he rendered them more insecure than ever, by participating in the plunder which the *klephtis* (robbers) were allowed to make. The result was, his deposition by the porte; but he speedily purchased back its favor, for he was a master-hand at bribery. Shortly after this, he acquired a high reputation as a soldier, and did such good service to the Turks in their Austro-Russian war of 1787, that he was named pasha of Trikala in Thessaly; at the same time he seized Janina or Joannina, of which he got himself appointed pasha by the instrumentality of terror, a forged firman, and bribery. It must be admitted that, as a ruler, he now displayed many excellent qualities. He swept his old friends, the robbers, from the mountain-roads, incorporated them into military troops, quelled the wretched factions that prevailed, and everywhere introduced order in the place of anarchy by the vigor and vigilance of his administration.

A short time after this, he entered into an alliance with Napoleon Bonaparte, who sent him engineers. When Bonaparte was defeated in Egypt, Ali, in 1798, took the places in Albania possessed by the French. After a three years' war, he subdued the Suliot, for which the Porte promoted him to be governor of Roumania. About this time, he revenged upon the inhabitants of Gardiki an injury done to his mother 40 years before, by the murder of 739 male descendants of the original offenders, who themselves were all dead.

In the interior of his dominions, Ali maintained the strictest order and justice. Security and peace reigned, high-roads were constructed, and industry flourished, so that the European travelers, with whom he willingly held intercourse, considered him an active and intelligent governor. From the year 1807, when he once more entered into an alliance with Napoleon, the dependence of Ali on the porte was merely nominal. Having failed, however, in his principal object, which was to obtain, at the peace of Tilsit, through the influence of Napoleon, Parga, on the coast of Albania, and the Ionian islands, he now entered into an alliance with the English, to whom he made many concessions. In return for these, they granted Parga, nominally to the sultan, but really to Ali. As he now considered his power to be securely established, he caused the commanders of the Greek *armatoles* (or Greek militia), who had hitherto given him assistance, to be privately assassinated one by one, while at the same time he put to death the assassins, to save himself from the suspicion of having been their instigator.

The porte at length determined to put an end to the power of this daring rebel ; and in 1820, Sultan Mahmoud sentenced him to be deposed. Ali resisted for a time several pashas that were sent against him ; but at last surrendered, on the security of an oath that his life and property would be granted him. Regardless of this, he was put to death, Feb. 5, 1822. Ali possessed, indisputably, great natural gifts, but along with them a character of the worst description. He never scrupled to use any means, provided it speedily secured his end. Yet we can hardly help admiring the singular talent which he invariably displayed. Like many other half-civilized monarchs and chiefs who have lived within the sphere of European influence, he was keenly alive to whatever transpired among the powers of Christendom. Though utterly illiterate himself, he had all the foreign journals translated and read to him. He watched every political change, as if conscious that the interests of his little region depended for their future prosperity on the west, and not on the east ; and made friendly advances to both the French and the English.

ALI PASHA. See AALI PASHA.

AL'QUOT PART. One quantity or number is said to be an A. P. of another, when it is contained in this other an exact number of times without remainder. Thus 2, $2\frac{1}{2}$, 4, and 5 are A. parts of 20, being contained in it 10, 8, 5, and 4 times. The consideration of A. parts occurs chiefly in the rule of *Practice*. Suppose we have to find the price of a number of articles at $6\frac{1}{2}d.$: since $\frac{1}{2}d.$ is the 8th part of $6d.$, to the price at $6d.$ (which is found at once in shillings, by taking half the number of articles) add $\frac{1}{8}$ of that price.

ALISMA CEE, a natural order of monocotyledonous plants, consisting of herbaceous plants either floating in water or growing in swamps. The leaves have parallel veins, even if expanded into a broad blade. The flowers are in umbels, racemes, or panicles ; the sepals 3, the petals 3, the number of stamens definite or indefinite. The ovaries are several, superior, one-celled, distinct or united ; the styles and stigmas equal to them in number. The fruit is dry, with one or two seeds in each carpel ; the seeds exalbuminous.—There are about 50 known species, excluding the natural order JUNCAGINEÆ, which is very nearly allied, and is included in this by some botanists. The species of both orders are chiefly natives of the northern parts of the world. **WATER PLANTAIN** (*alisma plantago*) is a very common plant in stagnant waters in Britain, and is not destitute of beauty. Its leaves, which have long footstalks, shoot up above the water, and amongst them but far above them rises the erect scape or leafless stem, dividing into slender whorled branches and branchlets, among which the little flowers appear to lie thinly scattered. The fleshy rhizome, or root-stock, is eaten by the Calmucks, after it has been deprived of its acidity by drying. The corms of the **ARROWHEAD** (*sagittaria*) possess somewhat similar properties. See **ARROWHEAD**.

AL'ISON, Rev. ARCHIBALD, was b. in Edinburgh in 1757. He studied at the university of Glasgow, and afterwards at Oxford. He took orders in the church of England in 1784, and subsequently held several preferments, among others a prebendal stall in Salisbury, and the perpetual curacy of Kenley, in Shropshire. From 1800, Mr. A. ceased to reside in England, and officiated in a chapel in his native city, where he d. in 1839. A. is principally known by his *Essays on the Nature and Principles of Taste*, first published in 1790. The second edition, in 1811, gave occasion to an article by Jeffrey, in the *Edinburgh Review*, which brought the book more before the public. It has since gone through several editions, and been translated into German and French. The *Essays* advocate what is called the "association" theory of the sublime and beautiful, and are distinguished for their pleasing and elegant style, and the fine feeling that pervades them. See **ÆSTHETICS**.

AL'ISON, Sir ARCHIBALD, Bart., b. at Kenley, Shropshire, in 1792, was the younger son of the Rev. Archibald A., author of the *Essays on the Nature and Principles of Taste*. His mother was Dorothea Gregory, daughter of Dr. John Gregory of Edinburgh. In 1800, his father removed to the Scottish metropolis, where he had accepted the senior charge in the Episcopal chapel in the Cowgate, and thus A. had the advantage of studying in a city then, as now, distinguished for its politeness and learning. At Edinburgh university he obtained the highest honors in Greek and mathematics. After he had finished his curriculum, he became a member of the Scottish bar in 1814, but spent a considerable number of years on the continent, before devoting himself to legal avocations. In 1822, he was named advocate-depute, which office he held till 1830. He now began to appear as a writer on law, politics, and literature. His *Principles of the Criminal Law of Scotland*, published at Edinburgh in 1832, is considered a standard authority on the subject. In the following year he published a sequel to the work, entitled *The Practice of the Criminal Law*. In 1834, he was appointed sheriff of Lanarkshire, by Sir Robert Peel ; in 1845, the students of Aberdeen elected him "lord rector" of Marischal college ; in 1851, he received the same honor from Glasgow university, and subsequently the title of D.C.L. from the university of Oxford. He received a baronetcy in 1852. His great work is undoubtedly *The History of Europe during the French Revolution* (10 vols. 8vo, 1839-42), which narrates the events from 1789 to 1815 ; a continuation, under the title of *The History of Europe from the Fall of Napoleon to the Accession of Louis Napoleon* (9 vols.), was finished in 1859. He also published a *Life of the Duke of Marlborough*, *The Principles of Population*, etc., *Free Trade and Protection*, *England in 1815 and 1845*.

besides contributing for many years to *Blackwood's Magazine* a series of tedious articles on tory politics. It is very difficult to characterize Sir A. A.'s *magnum opus*, *The History of Europe*. Although a work of immense industry, of very respectable accuracy, written with great animation and tolerable candor, it has failed to impress critics with a high idea of Sir A. A.'s abilities. The style is at times excessively wordy, and even when animated it is never picturesque. Neither has he much insight into events or characters. Nevertheless, as his work supplied a felt want, and is sufficiently entertaining for a large class of readers, it met with an excessive popularity. It has gone through numerous editions, and has been translated into German, French, Arabic, and other languages. A. d. May, 1867.

ALISON, GENERAL Sir ARCHIBALD, Bart., K.C.B., son of the historian; b. at Edinburgh, 1826; entered the army in 1846; served in the Crimea; in India, where he lost an arm; in the Ashantee expedition, 1873-4, and in Egypt, 1882. He became lieutenant-general in 1882, but in 1883 resigned on account of ill health; was promoted to general, 1889.

ALISON, WILLIAM PULTENEY, M.D., b. 1790; political economist, physician, and professor of the practice of medicine in the univ. of Edinburgh, from which last office he retired in 1855; was an elder brother of the historian. He was extremely popular with all classes of the community, from the amiable and humane disposition which he invariably showed in his efforts to alleviate the sufferings of the poor. A pamphlet published by Dr. A., in 1840, to show how the inadequate provision for the poor in Scotland led to desolating epidemics, was the principal means of bringing about an improved poor-law for that country. His other writings are—*Outlines of Physiology and Outlines of Pathology and Practice of Medicine*. In a work published at Edinburgh in 1850, entitled a *Dissertation on the Reclamation of Waste Lands*, he fully examines the subject, and recommends the colonization of these by paupers and criminals. He d. Sept., 1859.

ALI WAL', a village near the southern bank of the Sutlej, and not far from the town of Loodiana, in lat. 30° 57' n., long. 75° 36' e. It was the scene of a fierce conflict between the British and Sikh forces on the 28th of Jan., 1846. The latter having crossed the river for the purpose of foraging, or otherwise obtaining supplies, had threatened Loodiana, when they were attacked by Sir Harry Smith, defeated, and driven back with great slaughter. The victory of A. is said by good judges to have been "without a fault."

ALIZARIN, the coloring matter used in the dyeing of Turkey red, exists in the madder root as a glucoside, which, when boiled with acids or alkalies, gives glucose and A. In 1869 Graebe and Liebermann discovered a method of manufacturing it from the coal-tar product anthracene, this synthesis being the first instance of the artificial production of a natural coloring matter. The manufacture of A. is now one of the most important branches of the coal-tar coloring industry, and threatens to put an end to the growing of madder root. The 14,000 tons of A. produced in 1880 were reckoned equal in coloring power to 126,000 tons of madder. But the artificial dye is inferior to the natural in permanence. A. is represented by the formula $C_{14}H_6O_2(OH_2)$. See ANTHRACENE.

ALKAHEST, or ALCAHEST, the universal solvent of the alchemists. See ALCHEMY.

ALKALIES. The word *alkali* is of Arabic origin, *kali* being the name of the plant from the ashes of which an alkaline substance was first procured. The name now denotes a class of substances having similar properties. The alkalies proper are potash, soda, lithia, caesia, rubidia, and ammonia. The first five are oxides of metals; the last is a compound of nitrogen, hydrogen, and oxygen, and, being in the form of a gas, is called the volatile alkali. Potash being largely present in the ashes of plants, is called the vegetable alkali; and soda, predominating in the mineral kingdom, is designated the mineral alkali. The *alkaline earths*, as they are called—lime, magnesia, baryta, and strontia—are distinguished from the former by their carbonates not being soluble in water. The distinguishing property of alkalies is that of turning vegetable blues green, and vegetable yellows reddish brown. Blues reddened by an acid are restored by an alkali. The alkalies have great affinity for acids, and combine with them, forming salts, in which the peculiar qualities of both alkali and acid are generally destroyed; hence they are said to neutralize one another. In a pure state alkalies are extremely caustic, and act as corrosive poisons. Combined with carbonic acid, especially as bicarbonates, they are used to correct acidity in the stomach; but the injudicious and continued use of them is attended with great evil.

ALKALIMETER. Commercial potash and soda always contain greater or less quantities of foreign substances, such as sulphate of potash, common salt, silicates, oxide of iron, water, etc., which diminish the percentage of real alkali in a given weight. It is important, then, for the manufacturer to have some simple and ready means of determining the proportion of pure carbonate of potash or soda contained in any sample, that he may be able to judge of its value. Ordinary chemical analysis takes too much time. The A. serves this purpose. It consists of a graduated glass tube, filled with diluted sulphuric acid, and containing as much absolute sulphuric acid as would neutralize a given weight, say 100 grains, of carbonate of potash; 100 grains of the article to be judged of is then dissolved in water, and as much acid is gradually added to it from

the tube as to neutralize the solution, that is, take up all the alkali. The application of colored tests determines when the neutralization is complete. The purer the article, the more of the acid will be required; and if the tube, which is divided into 100 degrees, has been emptied to the 80°, the impure article contains 80 per cent of pure carbonate of potash.

This method of determining the strength of alkalies is called the *alkalimetry process*; but the instrument is not confined in its use to the estimation of the strength of alkaline substances. It is likewise employed in the determination of the strength of acids, such as sulphuric acid, hydrochloric acid, nitric acid, and acetic acid (vinegar). For this end, the graduated instrument is charged with a solution of an alkali of known strength, such as a given weight of crystallized carbonate of soda (washing soda), dissolved in water, and according to the number of divisions of the liquid poured from the A., the strength of the acid into which the alkaline liquid has been decanted, is calculated. The latter application of this instrument is called *acidimetry*. Again, the same graduated glass tube has been recently employed in many other ways, such as the determination of the strength of a solution of silver, by charging the instrument with a known or standard solution of common salt; and for this purpose it is used largely by the assayers to the royal mint, and other metallurgic chemists. This mode of analysis is every day becoming of more and more importance, and, in fact, has given rise to a new department of analytical chemistry, which has been designated *volumetric analysis*.

ALKALOIDS form an important class of substances discovered by modern chemistry. They are divided into two classes—namely, *natural* and *artificial*. The natural A. are found in plants and animals, and are often designated *organic bases*. Those obtained from plants are likewise called *vegeto-alkalies*. They are composed essentially of carbon, hydrogen, and nitrogen; besides which, the greater number contain oxygen. The A. have generally an energetic action on the animal system, and hence are every day employed in small doses as medicine; whilst in comparatively large doses they are powerful poisons. They have, although in a low degree, the characteristic alkaline properties on vegetable colors, etc.; have generally a bitter acrid taste; and form the active principles of the plants in which they are found. Such are morphia, codeine, and narcotine, found in opium; quinine and chinconine, in chincona bark; strychnine, in nux-vomica; hyoscyamine, in henbane; nicotine, in tobacco; piperine, in black pepper; caffeine or theine, in coffee and tea, etc.

The animal A. are few in number, the more important being urea, found in the urine of the mammalia; and kreatine and kreatinine, two of the constituents of the juice of flesh. The artificial A. are those organic bases which are not found in any known plant or animal, but of which the later researches of chemists have contrived to form a large number. As the artificial A. do not differ essentially from the natural A. in composition, structure, or properties, it is confidently believed that the day is not far distant when all of the A. will be prepared artificially; indeed, recently several of the natural A. have been manufactured on the small scale without the intervention of the living plant or animal. For instance, urea can be formed from the simplest form of dead organic nitrogenous matter.

AL'KANET (*anchusa*), a genus of plants belonging to the natural order *boraginæ*, and having a 5-partite calyx, a funnel-shaped or salver-shaped corolla, with five scales closing its mouth, five stamens, an obtuse stigma, and ovate achænia, which are surrounded at the base by a plaited tumid ring. The species are herbaceous plants, rough with stiff hairs, and having lanceolate or elongato-ovate leaves, and spike-like, bracteated, lateral, and terminal racemes of flowers, which very much resemble those of the species of *myosotis*, or forget-me-not.—The COMMON A. (*A. officinalis*) grows in dry and sandy places, and by waysides, in the middle and n. of Europe. It is rare and a very doubtful native in Britain. The flowers are of a deep purple color. The roots, leaves, and flowers were formerly used in medicine as an emollient, cooling, and soothing application.—The EVERGREEN A. (*A. sempervirens*) is also a native of Europe, and a doubtful native of Britain, although not uncommon in situations to which it may have escaped from gardens, being often cultivated for the sake of its beautiful blue flowers, which appear early in the season, and for its leaves, which retain a pleasing verdure all winter. It is a plant of humble growth, rising only a few inches above the ground.—A number of other species are occasionally seen in our flower-borders.—*A. tinctoria*, to which the name A. or ALKANNA (Arab. *al-chenneh*) more strictly belongs, is a native of the Levant and of the s. of Europe, extending as far n. as Hungary. The root is sold under the name of A. or alkanaroot; it is sometimes cultivated in England; but the greater part is imported from the Levant or the s. of France. It appears in commerce in pieces of the thickness of a quill or of the finger, the rind blackish externally, but internally of a beautiful dark-red color, and adhering rather loosely to the whitish heart. It contains chiefly a resinous red coloring matter, called *alkanna red*, *anchusic acid*, or *anchusine*. The color which it yields is very beautiful, although not very durable. It is readily soluble in oils, and is therefore in very general use amongst perfumers for coloring oils, soaps, pomades, lip-salves, etc. It is extensively used for coloring spurious port-wine. It also enters into compositions for rubbing and giving color to furniture. Its solutions in oils and alcohol have almost a carmine red color, although to water it gives

only a brownish hue. It combines with alkalis, forming blue solutions; with chloride of tin, it becomes of a carmine red; with acetate of lead, blue; with sulphate of iron, dark violet; with alum, purple; and with acetate of alumina, violet.—*VIRGINIAN A.* (*A. Virginica*) yields a similar coloring-matter, and is used in the same way.

ALKAN NA (*al-henna*) is also a name given to a coloring-matter prepared from the leaves of *Lawsonia inermis*, and used by oriental ladies to give a red color to their nails. See **HENNA**.

AL-KIN'DI, **ABU YUSUF**, lived in the first half of the 10th c., called "The Philosopher of the Arabs;" author of more than 200 works on philosophy in general, logic, politics, ethics, arithmetic (under which he discusses the unity of God), spherology, theory of music, astronomy, meteorology, geometry, cosmology, astrology, medicine, and various arts, besides controversial writings. Only those in astrology and medicine remain. He was one of the earliest translators and commentators of Aristotle, and his name marks the first philosophical revolt against Islamism.

ALKMAAR', an old t. in the province of North Holland, in the Netherlands, situated on the Helder canal, 20 m. n.n.w. of Amsterdam, in lat. 52° 38' n., long. 4° 43' e.; pop. '90, 15,833. It is well built, has very clean streets, and is intersected by broad canals. It possesses a town-house, ornamented with curious gothic carving, and the church of St. Lawrence which dates from the fifteenth century. The inhabitants support themselves by important manufactures of sailcloth, sea-salt, etc., as well as by trade in grain, butter, and cheese. A. exports great quantities of the last mentioned commodity. It is the birthplace of Henry of A. (See **ALKMAAR**, **HEINRICH VON**.) Here, on Oct. 18, 1799, the duke of York signed a not very honorable capitulation, after his Russo-British army had been twice defeated by the French gen. Brune.

ALKMAAR', **HEINRICH VON**, a German writer, lived in the latter half of the 15th c. He was the translator of the famous satirical historical poem, *Reineke Vos* (Reynard the Fox, q.v.), which he declared that he took from the Walsch language, now supposed to be the Walloon. He was tutor of the duke of Lorraine, and little is known of his history. Some have thought A. to be a pseudonym.

AL LA BREVE. In old music, the breve, \equiv , as the longest note, was equivalent to our semi-breve, \equiv , the longest note commonly used in modern music. Consequently, the minims anciently used were equivalent to our crotchets. Music written with four minims in a bar is signed *alla breve*, which implies that the four minims must be sung as four crotchets. The difference between the two styles of writing is merely formal. Other signs for A. B. time are— $\frac{3}{4}$, 2, or C , or *alla capella*.

AL LAH (compounded of the article *al* and *ilāh*—i.e., "the worthy to be adored") is the Arabic name of the one God, to whose worship Mohammed pledged his followers; and the word has passed into all languages wherever the name of Islam has been heard. The notions of the character of this God given by Mohammed in the Koran bear manifest traces of Jewish and Christian influence, and are much superior to the national superstitions and impassioned fancies of the orientals in general. Above all other things, Mohammed inculcated the unity of God in the strictest sense, in opposition not only to idolatry, but also in some points to the belief of the Jews and Christians, as is seen in the following formula or creed: "There is no God but the God (Allah). This only true, great, and highest God has his existence of himself, is eternal, *not begotten, and begets not*, suffices for himself, fills the universe with his infinity, is the center in whom all things unite, manifest and concealed, Lord of the corporeal and spiritual worlds, creator and ruler, almighty, all-wise, all-good, merciful, and his decrees are irrevocable." Mohammed has ventured on very bold illustrations of these attributes for popular representation, as in the passage of the Koran where he says: "If all the trees on earth were pens, and if there were seven oceans full of ink, they would not suffice to describe the wonders of the Almighty." The different attributes of God, divided under his 99 names, and connected together in a certain order in a litany, form the rosary of the Mohammedans, which concludes with the name A., as the hundredth, including in itself all the former epithets.

AL LAHABAD', a British district in the n.w. provinces of India, between lat. 24° 49', 25° 44'; long. 81° 14', 82° 26'. It is 85 m. in length by 50 in breadth—area, 2765 sq. m. The surface of the country is in general level, with a slope towards the s.e. The principal rivers are the Ganges (flowing partly within it, and partly dividing it from Oude and Mirzapore), and its great affluent the Jumna, which joins it at the city of A. The district is well watered, and vegetation is luxuriant. The native agriculture at the end of the last century was singularly rude and deficient, but the efforts of British residents have done much for its improvement. The principal products of the district are cotton and salt; and there is a brisk transit trade by the Jumna in cotton, indigo, and sugar. The four principal towns of the district of Allahabad, are Allahabad, Shahzadpore, Bhugeisur, and Adamপুর.—The province or "division" of A. comprehends the districts of Cawnpore, Futtehpur, Hameerpore, and Jhansi, Jalaun, Lalitpur, Banda, and A. It is bounded n. by Oude and Agra, e. by Behar, s. by Gundwana, and w. by Malwa. Its

length is about 270 m.; breadth, 120; area, 17,264 sq.m.; pop. 5,757,000. It comprises one of the most populous and productive territories in India.

AL LAHABAD ("city of God"), the seat of the government of the n.w. provinces of British India, occupies the fork of the Ganges and Jumna, lat. 25° 26' n., long. 81° 85' e., thus forming the lowest extremity of the extensive region which, as lying between those natural boundaries, is distinguished as the *Doab*, or the country of *Two Rivers*—an analogous term to the *Punjab*, or the country of *Five Rivers*. The situation of A., at the confluence of the holy streams of India, besides giving the city its sacred appellation, has rendered it a much frequented place of pilgrimage for the purposes of ablution, some of the devotees sinking themselves with weights to rise no more. In point of appearance, A. was scarcely worthy of its character and renown. With the exception of a few ancient monuments of costly, elaborate, and tasteful workmanship, the native part of the city consists of mean houses and narrow streets. As in the towns generally of India, the European quarter, on the whole, is vastly superior. Its nucleus appears to have been the native fort, which, on the e. and s., rises directly from the banks of both rivers, while towards the land its artificial defenses, of great strength in themselves, are not commanded from the neighborhood by any higher ground. This citadel, described by Heber as having been at one time "a very noble castle," has lost much of its romance by having had its lofty towers pruned down to bastions and cavaliers. The Europeans of the garrison occupy well-constructed barracks. Beyond the fort are the cantonments for the native troops. In connection with these are numerous villas and bungalows, few other spots in India boasting such handsome buildings of this kind; and these showy retreats are rendered still more attractive and agreeable by avenues of trees, which wind between them, and connect them with the fort, the city, and several of the circumjacent localities.

The summer of 1857 brought disaster to A. On the 6th of June of that year, the insurrection, which had begun at Meerut on 10th May, extended itself to A. Though the Europeans continued to hold the fort, yet the mutineers were, for some days, undisputed masters of all beyond; and between the ravages of the marauders and the fire of the garrison, the city soon became little better than a heap of blackened ruins. In the history of this fearful outbreak, A. must be "a magic word" to every English ear, as the spot where the fiery Neill entered on his brief career of glory. It was here also that Lord Canning, after the close of the mutiny, distributed three millions sterling in presents to the chiefs who had remained loyal. But although situated thus in the heart of the outbreak, and feeling its disastrous effects, the city possesses natural advantages that have allowed it to recover. Its position at the confluence of the holy rivers, which has so long made it a center of superstitious reverence and worship, now renders it naturally a center of commerce and civilization, and has been fully appreciated by government. It commands the navigation both of the Ganges and of the Jumna. It is on the direct water-route between Calcutta and the upper provinces; and is a main station, not only on the Grand Trunk road, but also on the East Indian railway. New buildings, many of them possessing great architectural merits, have accordingly sprung up with rapidity since 1857; the most noteworthy buildings being still, however, the great mosque and the Sultaun Khossor's caravanserai—a fine cloistered quadrangle. The fort is of red stone, and is approached by a very handsome gate: it contains the palace or residency, and the Gada pillar or club of Bhin Sen, in the Chalee Satoom temple, which is said to communicate with Benares by a subterranean passage, through which flows a third holy river, the Sereswati, visible only to the eye of faith. A. possesses a college, a hospital, theaters, bazaars, etc. The inhabitants number (1891) 176,870. So many poor pilgrims throng the city, especially at the time of the great fair, which is held once every twelve years, that instead of Allahabad, the natives call it "Fakirabad," or the city of beggars. The cotton, sugar, and indigo produce of the fertile district of A. is brought in large quantities into the city, to be transported thence to Calcutta and elsewhere. Steamers sail to Calcutta and barges to Delhi. A. is distant from Calcutta, by land, 496 m.; by water, 808 m. in the rainy season; by water, 985 m. in the dry season. From Delhi it is distant 386 m.; and from Bombay by the Jubbulpore branch of the East Indian railway, 840 m.

ALLAMAKEE', a co. in n.e. Iowa; 615 sq.m.; pop. '90, 17,907. It is fertile and well timbered; agriculture is the chief business. Co. seat, Waukon.

ALLAMAND', JEAN NICHOLAS SÉBASTIEN, 1713-87; a Dutch philosopher and professor of natural history at Leyden. He did good service to science in translating Buffon's and other works, collecting plants, and investigating electricity. He was a member of the British royal society.

ALLAMAN'DA, a genus of plants of the natural order *apocynaceæ* (q. v.), distinguished by a 5-parted calyx without glands, a funnel-shaped corolla with its limb campanulate, and the fruit a prickly capsule. *A. cathartica*, a native of the West Indies, is a shrub with whorled or opposite oblong leaves, and large yellow flowers on many-flowered footstalks. It has violently emetic and purgative properties; but in small doses, an infusion of the leaves is esteemed a valuable cathartic medicine, especially in the cure of painter's colic. All the species are natives of the tropical parts of America.

ALLAN, DAVID, a distinguished Scottish painter of domestic subjects, in which he was the forerunner of Wilkie, was b. at Alloa in 1744. In 1755, he entered the academy for drawing, painting, and engraving, established in Glasgow by the celebrated printer Foulis, where he studied for seven years. The liberality of friends enabled him, in 1764, to go to Rome, where he resided for 16 years. In 1773, he gained the gold medal given by the academy of St. Luke for the best historical composition. The subject was the "Origin of Painting," the old legend of the Corinthian maid who drew her lover's profile from the shadow. This picture, the highest effort of Allan's powers, was engraved by Cunego. Of his other pictures executed at Rome, the best known are four humorous pieces illustrating the carnival, which were engraved by Paul Sandby. In 1777, A. came to London, where he painted portraits; after a year or two, he removed to Edinburgh; and in 1786, succeeded Runciman at the head of the art academy established there by the board of manufacturers. His works subsequent to this date were chiefly of a humorous description, and illustrative of Scottish domestic life. His illustrations of Allan Ramsay's *Gentle Shepherd* became very popular, but are of no great merit. A. died at Edinburgh in 1796. "His merits," says Allan Cunningham, "are of a limited nature; he neither excelled in fine drawing nor in harmonious coloring; and grace and grandeur were beyond his reach. His genius lay in expression, especially in grave humor and open drollery."

ALLAN, Sir HUGH, 1810-82. He came from Scotland to Canada as a clerk, 1826, and in 1835 became a shipbuilder and commission merchant. During the Canadian rebellion, 1837-8, he entered the army as a volunteer, and was finally made captain. He helped establish, after many disasters, the Allan line of screw-steamers, and was one of the projectors of the Canadian Pacific railroad. The Montreal Telegraph Co., Canada Inland Navigation Co., and many manufacturing and mining companies owed their success largely to his enterprise. He was knighted, 1871, for his services to commerce. He was one of the wealthiest men in Canada.

ALLAN, Sir WILLIAM, a distinguished Scottish historical painter, was b. in Edinburgh in 1782. He was educated at the high school; and having early displayed a taste for drawing, was entered as a pupil in the School of Design connected with the royal institution, with the intention of becoming a coach-painter. Among his fellow-students and friends were David Wilkie, John Burnet, and others who afterwards rose to eminence. He subsequently studied for some time at the Royal Academy of London. Finding difficulties in the way of professional advancement in the metropolis, he determined to go abroad; and in 1805, set out for St. Petersburg, where the friendly interest of his countryman, Sir Alexander Crichton, the imperial family physician, soon procured him employment. In the Russian capital he spent several years, diligently pursuing his professional labors, and making occasional tours to the s. of Russia, the Crimea, Turkey, and Circassia, where he made numerous sketches, some of which supplied the materials of his best known works. In 1814, he returned to Edinburgh, and soon after exhibited his "Circassian Captives," a large picture, distinguished by the picturesqueness of the subject and the elaborate fidelity and spirit of its treatment. He had exhibited several pictures before this, but not till now was his reputation as an artist fairly established. The remuneration of his labors, however, was not so ready as the public acknowledgment of their worth. The purchase of two of his pictures by the grand duke Nicholas, afterwards emperor, when on a visit to Edinburgh, contributed in no small degree to promote the sale of his works. A severe attack of ophthalmia obliged him for a time to suspend his exertions. He employed his leisure in visiting Italy, Turkey, Greece, and Asia Minor. On returning home he resumed his brush, and for many years labored with great assiduity. In 1826 he was elected an associate of the London Academy; in 1835, an academician. In 1838, on the death of Mr. George Watson, the Royal Scottish Academy elected him as its president, and on the death of Sir David Wilkie, in 1841, he was appointed limner to her majesty for Scotland. He was at the same time knighted. At intervals he made excursions into the continent, visiting Spain and Morocco in 1834, St. Petersburg in 1841, and Germany and Belgium in 1847. At St. Petersburg, he received a commission from the emperor to paint a large picture of "Peter the Great teaching Shipbuilding to his Subjects," it was exhibited at London in 1845, and is now in the imperial winter palace. For some time before his death, he had been diligently working at a great picture of "Bruce at Bannockburn." He died in his painting-room, to which his bed had been removed, on the 22d of Feb., 1850. The great merits of Sir W. A. as a painter consist in his conscientious fidelity, his skill in composition, and the dramatic force of his representations. The impulse contributed by him to historical painting, especially of national subjects, entitles him to a very high place in the history of Scottish art. Among his chief works, many of which are well known through engravings, are—"John Knox admonishing Queen Mary," 1823; "Queen Mary signing her Abdication," 1824; "Death of the Regent Moray," 1825; "Polish Exiles," 1834; "The Slave-market at Constantinople," 1837; "Battle of Prestonpans," 1842; "Waterloo," two pictures, from the French and English positions, the first of which was bought by the duke of Wellington.

ALLAN'TOIS, a delicate membranous bag, which makes its appearance in the eggs of birds during incubation, and is a provision chiefly for the aeration of the blood of the embryo or chick. It sprouts from the lower part of the intestine of the chick, and rapidly

enlarges, so as almost completely to inclose it, lining nearly the whole extent of the *membrana putaminis*—the double membrane which is immediately within the egg-shell. It is covered with a net-work of arteries and veins, corresponding to the umbilical artery and vein of mammalia; and the aëration of the blood is accomplished by the air which enters through the pores of the shell; but as the lungs become capable of their function, the circulation in the A. diminishes, and its footstalk contracts, and at last divides, leaving only a ligamentous remnant. The A. is never developed in the eggs of fishes and amphibians, hence these are called anallantoid vertebrates; while reptiles, birds, and mammalia, in which it is present, are called allantoid. In the mammalia, it is superseded at an early period of foetal life by other contrivances, but continues to exist in the lower animals for receiving the urinary secretion through the urachus, a purpose which it serves in birds and reptiles likewise. In the human species, it disappears very early, only a minute vesicle remaining.

ALLARD, generalissimo of the army of Lahore, and previously adjutant to marshal Brune under Napoleon, was b. in 1788. After the murder of marshal Brune (q.v.), A. left France (1815), intending to emigrate to America; but changed his plan, entered into the service of Abbas-Mirza of Persia, and afterwards went to Lahore (1820), where he engaged in the service of Runjeet Singh (q.v.), by whom he was made generalissimo, and whose forces he organized and trained in the European modes of warfare. Having married a native of Lahore, he identified himself with the interests of his adopted country, but could not entirely forget France. The July revolution brought him back to Paris, where he was received with distinction, and was made French *chargé d'affaires* in Lahore. He presented to the royal library of Paris a valuable collection of coins, and returned to Lahore (1836), leaving his wife and children in Paris. In the subsequent battles of Runjeet Singh with the Afghans, A. repeatedly distinguished himself, and died at Peshawur, Jan. 23, 1839. His remains were, according to his own wish, buried with military honors at Lahore.

ALLEGAN, a co. in w. Michigan, on lake Michigan; 835 sq.m.; pop. '90, 38,961. A navigable river, the Kalamazoo, flows through it, and several railways intersect it. The soil is fertile, lumber is produced, and brick and carriages are made. Co. seat, Allegan.

ALLEGAN, the capital of A. co., Mich., at the head of navigation on Kalamazoo river; 33 m. s. of Grand Rapids. It is on the Lake Shore and Michigan Southern, the Chicago and West Michigan, and the Cincinnati, Jackson and Mackinaw railroads. It has national banks, a high school, newspaper offices, mills, manufactures of paper and furniture, machine shops and foundries. Pop. '90, 2669.

ALLEGANY, a co. in the extreme n. w. of Maryland; 477 sq. m.; pop. '90, 41,571—incl. colored. The Potomac river is on the s.; the Alleghany mountains occupy part of the co. Bituminous coal, limestone, and iron ore are found; dairy produce, lumber, leather, hydraulic cement, and fire-brick are produced. There is abundant water-power. Co. seat, Cumberland.

ALLEGANY, a co. in w. s. w. New York, on the Pennsylvania border; intersected by Genesee river and New York and Erie railroad; 1060 sq. m.; pop. '90, 43,240. Bog ore and limestone are found, cattle, wool, hay, and grain are produced; leather, lumber, flour, etc., manufactured. Co. seat, Belmont.

ALLEGHANIES, a name perhaps originally limited to the mountain-cradle of the river next mentioned, but often popularly extended to the whole chain, otherwise called the Appalachians (q. v.).

ALLEGHANY, a river, which, rising in the n. part of Pennsylvania, unites with the Monongahela at Pittsburg to form the Ohio. Though it flows through a hilly country, yet it is navigable for nearly 200 m. above Pittsburg, whence by the Ohio and the Mississippi the navigation extends to the gulf of Mexico.

ALLEGHANY, a co. in n. w. North Carolina; 284 sq. m.; pop. '90, 6523, incl. colored. It is in the Alleghany mountains, and the region is noted for copper ore. Co. seat, Sparta.

ALLEGHANY, a co. in western Virginia, drained by Jackson river, one of the heads of the James; 510 sq. m.; pop. '90, 9283, incl. colored. The Chesapeake and Ohio railroad connects it with the seaboard. Tobacco, grain, and wool are raised. There are valuable mineral springs. Co. seat, Covington.

ALLEGHENY, a co. in w. s. w. Pennsylvania; 750 sq. m.; pop. '90, 551,959. Near the middle of the co. the A. and Monongahela rivers join and form the Ohio. Co. seat, Pittsburg.

ALLEGHENY, city in Allegheny co., Pa.; at the confluence of the Allegheny and the Ohio rivers, and on the Pittsburg, Fort Wayne, and Chicago, the Pittsburg and Lake Erie, the Pittsburg and Western, and the Western New York and Pennsylvania railroads, opposite Pittsburg, with which it is connected by several bridges. It was chartered as a city in 1840; has an area of eight square miles; and is noted for its manufactures of iron and steel, glass and locomotives, and for its large coal interests. In the centre is the Public Park, with fountains, lakes, and a monument to Humboldt.

The City Hall is at the crossing of Ohio and Federal Streets, and directly opposite is the free library presented by Andrew Carnegie. On a conspicuous elevation in the eastern part is an imposing monument to the memory of the Union Soldiers from the county who lost their lives in the civil war, and near by is the Hampton Battery monument. In the northern part, also on an elevated site, is the Allegheny Observatory, belonging to the Western University of Pennsylvania. The Western, or Riverside, Penitentiary is a large stone building on the bank of the Ohio. Other notable public buildings are the Western Theological Seminary (Presbyterian, established in 1827); the Theological Seminary of the United Presbyterian Church (established in 1826); the Reformed Presbyterian Theological Seminary (organized in 1840); the Allegheny General Hospital; Presbyterian Hospital; St. John's General Hospital; Home for Friendless; House of Industry; orphan asylum; United States arsenal; public school library; and, among the numerous churches, St. Peter's (R. C.), Trinity (Evan. Luth.), North Avenue (M. E.), Second (Unit. Pres.), and Sandusky Street (Bapt.). The city has electric lights and street railroads, waterworks system that cost over \$1,000,000. Several national and other banks, numerous building and loan associations, and daily, weekly, and monthly periodicals. Besides its importance as a manufacturing centre, the city has exceptional advantages as a shipping point, being readily accessible by more than 20,000 miles of inland navigation, much of which is facilitated by the Davis Island movable dam, which cost over \$1,000,000. Pop. '90, 105,287.

ALLEGHENY COLLEGE was founded at Meadville, Pa., in 1815, when this place was a village of about 400 people. It was incorporated as a college in 1817, and its first president was Rev. Timothy Alden, D.D., of the Presbyterian Church. He and Rev. Robert Johnston, the vice-president, were for some years all the faculty that the college had. Ex.-Gov. Winthrop, of Mass., gave it a private library valued at \$6000. In 1833 it passed under the control of the Methodist Church. Rev. Martin Ruter, D.D., was president from 1837 to '47. Its next president, Dr. Homer J. Clark, collected \$100,000 for its benefit, of which \$60,000 were invested for a permanent endowment. The other presidents have been Rev. John Barker, elected in 1847, Rev. George Loomis, D.D., elected in 1860; Rev. L. H. Bugbee, D.D., 1875; Rev. D. H. Wheeler, LL.D., 1883; Rev. G. H. Williams, D.D., 1888; Dr. Wheeler again 1889; and Dr. William H. Crawford, 1893. The late Bishop Simpson was vice-president in 1837-38, and the late Bishop Kingsley was a professor here from 1841 to 1856. The value of the buildings, grounds, and apparatus is now estimated at \$300,000, and the productive endowment is \$160,000. The college has no debts. There are four courses of study. Instruction in military science and practice is given by an officer detailed from the U. S. army. In 1896 the number of professors and tutors was 21, and of students, 355. Young women are admitted as students to equal privileges with young men. Tuition is free; a contingent fee is charged of \$15 per term.

ALLEGIANCE (Fr. *allégeance*, from Lat. *alligo* or *ad-ligo*, to bind to, or attach). "A." says Blackstone, "is the tie or *ligamen* which binds the subject to the sovereign, in return for that protection which the sovereign affords the subject. A. is the highest legal duty of the subject, and consequently its violation, *Treason* (q.v.), is the highest legal offense. A. is of three kinds: 1. *Natural or implied A.*, which every native or naturalized citizen owes to the community to which he belongs. Independently of any express promise, every man, by availing himself of the benefits which society affords, comes under an implied obligation to defend it, and this equally whether the attack be from without or from within. In time of war, this obligation involves the duty either of bearing arms in defense of the state, or of contributing to the additional taxes and other impositions which the support of a standing army may render necessary. In peaceful times it will be adequately fulfilled by an efficient performance of ordinary citizen duties. 2. *Express A.* is that obligation which arises from an expressed promise, or *oath of A.* The old English oath of A. corresponded in the case of the sovereign, as absolute superior of all the lands in England, to the oath of fealty which, by the feudal law, all vassals were required to take to subject superiors: "As administered for upwards of 600 years, it contained a promise to be true and faithful to the king and his heirs, and truth and faith to bear of life and limb and terrene honor, and not to know or hear of any ill or damage intended him, without defending him therefrom."—Blackstone, Kerr's edition, vol. i. 368. This oath being thought to favor too much the notion of non-resistance, another form was introduced by the convention parliament. That in use since the passing of the new naturalization act in 1870 (33 Vict. c. 14), is as follows: "I do swear that I will be faithful and bear true A. to her majesty Queen Victoria, her heirs and successors, according to law. So help me God." From the reign of Queen Elizabeth down to the present time, the oath of A. has been required from all public functionaries, before entering on their offices, and by all professional persons before being permitted to practice. 3. *Local or temporary A.* is that obedience and temporary aid due by an *alien* (q.v.) to the state or community to which he resides.

It is but recently that the various governments of Europe have been willing to recognize the right of persons to change their allegiance as well as their residence. The United States always held it to be a natural right, and our legislation so recognizes it.

The difference was strikingly manifest in the war of 1812, when the prince regent proclaimed that every native-born Briton taken prisoner while fighting for the Americans should be shot for treason, to which President Madison replied that if any naturalized American of the United States should suffer death in such manner he would execute two British prisoners. There were no executions of the sort which England had threatened. Very recently the question has been discussed as to the right of a government to subject to military service men who were once its citizens but were afterwards citizens of another country; and late decisions tend to show that most governments are abandoning the old claim, "once a citizen always a citizen." For instance, Germans naturalized in the United States on returning to Germany were formerly required to enter the army; but now they plead American citizenship, and with success. Allegiance is often transferred *en masse*, as on the treaty of peace in 1783, when British subjects who should so elect became Americans; also, when Louisiana and Florida were purchased and Texas was annexed; no inquiry was made about allegiance, but the official transfer made the creoles and the Texans as completely citizens owing allegiance as though born under the U. S. flag. The law of congress, July, 1868, very clearly sets forth the extent and obligations of allegiance. The preamble states that the right of expatriation is natural and inherent in all people and indispensable to the enjoyment of rights to life, liberty, and the pursuit of happiness; that, recognizing this right, our government has received emigrants from all nations and given them citizenship and protection; that it is necessary for the maintenance of public peace that the claim of foreign allegiance as to such adopted citizens should be promptly and finally disavowed; and therefore it was enacted that any declaration, opinion, order, or decision of any officer of this government which denies, impairs, restricts, or questions the right of expatriation, is inconsistent with the fundamental principles of the government; that all naturalized citizens of the United States, while in foreign states, are entitled to, and shall receive from this government, the same protection of person and property that is accorded to native-born citizens in like circumstances. This broad declaration of our rights and duties was followed in May, 1870, by the British parliament in an act revising all British laws on alienage, expatriation, and naturalization—the government for the first time recognizing the right of subjects to renounce allegiance to the crown.

ALLEGORY, as a figure of rhetoric, signifies properly, the embodiment of a train of thought in a visible form, by means of sensible images, having some resemblance or analogy to the thoughts. A., therefore, is one of the tropes (q. v.), for it involves a transfer of meaning. It differs from metaphor chiefly in extent; metaphor is confined to a single expression, or at most to a sentence. A. is carried through the whole representation. It is not abstract ideas alone that are adapted to allegorical treatment; not only may virtue and vice, for instance, be personified and treated allegorically, but real persons may be represented by allegorical persons.

We find A. in use from the earliest ages. Oriental people are specially fond of it. As examples from antiquity may be cited, the comparison of Israel to a vine in the 80th psalm; the beautiful passage in Plato's *Phædrus*, where the soul is compared to a charioteer drawn by two horses, one white and one black; the description of fame in the 4th book of the *Æneid*. Bunyan's *Pilgrim's Progress* is perhaps the most fully carried out A. of modern times.—A. is not confined to language, but is carried into painting and sculpture, and also into scenic representation—as in the ballet and pantomime; the consideration of it is, therefore, of importance in the fine arts generally.

ALLEGORICAL INTERPRETATION is that kind of interpretation by which the literal significance of a passage is either transcended or set aside, and a more spiritual and profound meaning elicited than is contained in the form or letter. The common idea is that it originated with the Alexandrine school, but this is by no means the case, as we find it employed by the older Hindus. From the scholars of Alexandria, however, it was adopted by the Jews of Palestine, a sect of whom in particular, namely, the Essenes, made abundant use of it. The apostle Paul himself allegorizes, or at least spiritually interprets the history of the free-born Isaac and the slave-born Ishmael (Gal. iv. 24). Allegorical interpretation, however, with reference to the Old Testament, was most extensively employed by Philo Judæus, a philosophical Jew of Alexandria, and a contemporary of Jesus Christ. His writings stimulated the allegorizing tendencies of the Alexandrine school of Christian theologians, the most famous of whom are Clemens Alexandrinus and Origen. The latter went so far as to say that "the scriptures are of little use to those who understand them as they are written." As a specimen of his method of biblical interpretation, we may adduce the following: He maintained that the Mosaic account of the garden of Eden was allegorical; that paradise only symbolized a high primeval spirituality; that the fall consisted in the loss of such through spiritual and not material temptation; and that the expulsion from the garden lay in the soul's being driven out of its region of original purity. The Neo-platonists were at first averse to allegorizing, but gradually acquired a relish for it from the Jews and Christians, and applied it to the ancient myths.

ALLEGRI, ANTONIO. See CORREGGIO.

ALLEGRI, GREGORIO, 1580–1652; a musical composer, b. in Rome, probably of the Correggio family. He studied under Nanani, and was a friend of Palestrina. He composed motets and sacred pieces; was appointed to the choir of the Sistine Chapel, Rome,

by Urban VIII., remaining until his death. He was one of the earliest composers for stringed instruments; but his most celebrated work is the *Miserere*, still annually rendered in the Sistine chapel on every Good Friday. Mozart, at the age of fourteen, performed the wonderful feat of writing the entire work from memory after having heard it but once. Allegri is regarded as a link between the Roman and Neapolitan periods of Italian music.

ALLEGRO, the fourth of the five principal degrees of movement in music, implying that the piece is to be performed in a quick or lively style. *A.*, like all the other degrees of movement, is often modified by other terms, such as *A. non tanto*, *A. ma non troppo*, *A. moderato*, *maestoso*, *giusto*, *commodo*, *vivace*, *assai*, *dé molto*, *con brio*, etc. As a substantive, *A.* is used as the name of a whole piece of music, or a movement of a symphony, sonata, or quartet. *Allegretto*, a diminutive of Allegro, somewhat slower than the latter and faster than Andante.

ALLEMANDE, a French dance said to have been invented in the time of Louis XIV., and which again became popular at the Parisian theatres during the reign of the first emperor. It has a slow waltz kind of tempo, and consists of three steps (*pas marchés*) made in a sliding manner, backward and forward, but seldom waltzing or turning round. The whole charm of the dance lies in the graceful manner of entwining and detaching the arms in the different steps. In England it was called *Almain* and is mentioned in Ben Jonson's play *The Devil is an Ass*, acted in 1610, which proves it of earlier origin. The name has also reference to a German dance of Swabia, of which Beethoven's 12 Deutsche Tänze for orchestra are specimens. The *Allemande* is also the name of a movement in the *Suite* (q. v.), having no relation to the dance of the same name. It usually consists of a figurative melody, which has a simple accompaniment.

AL LEINE, or **ALLEIN**, JOSEPH, 1633-68; an English nonconformist divine; author of *An Alarm to the Unconverted*. He was educated in Corpus Christi college, and became a tutor there. He was offered a political place, which he declined, but gladly took the office of assistant to George Newton, rector of the church of St. Mary Magdalene, Taunton. About this time he married Theodosia, daughter of Richard Alleine. He was not only constant in religious work, but deeply learned in various sciences, and on intimate terms with the patriarchs of the royal society. When the persecution of nonconformists came, he and his senior pastor were ejected, and A. became an itinerant preacher of the gospel wherever he could find opportunity. For this he was imprisoned, but released in May, 1664; yet in spite of the conventicle act or five-mile act, he pursued his work and was again imprisoned. His later years were full of persecution and suffering. No Puritan nonconformist name is more affectionately cherished than his.

AL LEINE, or **ALLEIN**, RICHARD, 1611-81; an English writer and theologian, author of *Vindiciæ Pietatis*; educated at Oxford; assistant in the ministry to his father, Richard A., and noted for eloquence. He declared for the Puritans, but continued for 20 years rector of Batcomb in Somerset. On the passage of the act of uniformity he went with the ejected, and, after the five-mile act, preached where he could find occasion. His *Vindication of Piety* was refused license, and Roger Norton, the king's printer, caused a large part of the first edition to be seized and sent to the royal kitchen for kindling; but, on reading it, he brought back the sheets and sold the work from his own shop, for which he had to beg pardon on his knees at the council table.

ALLEMAN NI. See **ALEMANNI**.

ALLEN, a co. in Indiana, on the Maumee river, and intersected by four railroads; 650 sq. m.; pop. '90, 66,689. It is level and fertile; agricultural products are the staples; machinery, flour, metal ware, and carriages are made. Co. seat, Fort Wayne.

ALLEN, a co. in s.e. Kansas; intersected by the Neosho river, and the Galveston and Leavenworth railroad; 504 sq. m.; pop. '90, 13,509. It has good timber; the soil is good for stock raising and general agriculture. Coal is found. Co. seat, Iola.

ALLEN, a co. in Kentucky, on the Tennessee border, 335 sq. m.; pop. '90, 13,092, inclu. colored. The surface is level; soil moderately fertile. Limestone caverns abound. Cattle, grain, tobacco, and wool are produced. Co. seat, Scottsville.

ALLEN, a co. in w.n.w. Ohio; intersected by the Auglaize and Ottawa rivers, and the Wabash and Erie canal; 447 sq. m.; pop. '90, 40,644. It is level, well timbered, and fertile; cattle, hay, wool, lumber, and grain are produced, and wheeled vehicles are made; two railroads intersect it. Co. seat, Lima.

ALLEN, ALEXANDER VIETS GRISWOLD, D.D., b. Otis, Mass., 1841; educated at Kenyon college and Andover theological seminary. He was rector of St. John's church (Prot. Epis.), Lawrence, Mass., 1865-7; and since 1867 has been professor of ecclesiastical history in the Episcopal theological school, Cambridge, Mass. He has published *Continuity of Christian Thought: A Study of Modern Theology in the Light of its History*, 1884; a life of Jonathan Edwards, 1889, etc. He advances, with an admirable spirit, views whose freshness has awakened thought and discussion.

ALLEN, CHARLES GRANT BLAIRFINDIE, B.A., a popular scientific author, better known as Grant Allen, was born at Kingston, Canada, in 1848, and was graduated at

Merton college, Oxford, in 1871. He has written a number of works treating of plants and animals as affected by evolution, among them, *Physiological Aesthetics* (1877); *The Color Sense* (1879); *The Evolutionist at Large* (1881); *Anglo-Saxon Britain* (1881); *Vignettes from Nature* (1881); *Colin Clout's Calendar* (1883); *Flowers and their Pedigrees* (1884); *The Story of the Plants* (1895). He has also written a life of Charles Darwin and a number of novels: *Philistia* (1884); *The Devil's Die* (1888); *The Woman Who Did* (1895); *A Bride from the Desert* (1896), etc.

ALLEN, ELIZABETH AKERS, an American poet, known by her *nom de plume* of "Florence Percy"; b. Me., Oct. 9, 1832. She married Paul (Benjamin) Akers, an American sculptor, and afterwards married E. M. Allen, of New York. She published volumes of poems in 1867 and 1891, and is best known as the author of *Rock me to sleep, Mother*.

ALLEN, ETHAN, 1737-89, b. Conn. He early settled in Vermont with four brothers, and became conspicuous in the contest in which both New Hampshire and New York claimed territorial jurisdiction. He was the agent of the settlers in a suit at Albany; the suit went against them, and they resolved upon resistance, making A. colonel of a force which drove out the New York settlers; whereupon Gov. Tryon offered £150 reward for his arrest. In this condition they were when the war of the revolution began, and one of the first points decided upon was the occupation of Ticonderoga. Allen starting at once with his Green Mountain boys, was soon joined by others, including Arnold; and on the morning of May 10, 1775, he surprised the English captain, Delaplace, in his bed, demanding surrender "in the name of the great Jehovah and the Continental congress." This stroke wrested all the northern region from the English. The Americans also took Skenesborough and Crown Point. A dispute between A. and Arnold about the command was ended by the arrival of a Connecticut regiment, with col. Hinman, who ranked both; and then A. proposed an invasion of Canada, but was not heeded. He went to Philadelphia, where congress acknowledged his services. Then he joined Gen. Schuyler's army, and was employed in secret missions to Canada, rendering valuable aid in Montgomery's expedition. He was taken prisoner, Sept. 25, 1775, in an unfortunate demonstration by Major Brown upon Montreal, and was sent to England. Some months later he was returned to this country and kept in the prison ships and jails in Halifax and New York until May 3, 1778, when he was exchanged. While a prisoner he was for the most part barbarously treated and kept heavily ironed. He was warmly received by Washington, and was going into the army again when he was diverted towards the old boundary troubles between New York and New Hampshire. While thus engaged an effort was made by the English through a conspicuous tory, Beverly Robinson, to seduce A. from his American loyalty, but of course without success, though he made the affair serve to preserve the neutrality of the English towards his mountaineers. A. was twice married and left a widow and seven children. He was noted as a free-thinker, or deist, and wrote *Reason the only Oracle of Man*, in which the Bible and religion are assailed with considerable vehemence.

ALLEN, FREDERIC DE FOREST, Ph.D., was born at Oberlin, Ohio, in 1844. He studied at Oberlin college, graduating in 1863, and at the University of Leipsic; was appointed to the chair of classical philology at Harvard University in 1880. Among his works are an edition of the *Medea* of Euripides, 1876; *Remnants of Early Latin*, 1880; Revision of *Hadley's Greek Grammar*, 1884; *Greek Versification in Inscriptions*, 1888, and contributions to the classical journals.

ALLEN, HORATIO, civil engineer, 1802-89; was the operator at Honesdale, Pa., of the first locomotive in the United States; was afterwards one of the engineers of the Croton Aqueduct and of the High Bridge over the Harlem River, and consulting engineer of the New York and Brooklyn bridge; invented the four-wheel truck for passenger cars.

ALLEN, IRA, 1751-1814; brother of Ethan. He served in the revolutionary army; was a member of the Vermont constitutional convention; was secretary of state; then treasurer, surveyor-general, and held other offices. While in France, in 1795, he bought 20,000 muskets and 24 cannon, intending to sell them to Vermont; but he was captured at sea, and taken to England on charge of furnishing arms to Irish rebels. He was acquitted after a lawsuit that lasted eight years. He published *The Natural and Political History of Vermont*.

ALLEN, JOEL ASAPH, an American zoologist, born at Springfield, Massachusetts, in 1838, accompanied Agassiz to Brazil in 1865, and in 1885 was appointed curator of Ornithology and Mammology in the New York Museum, after holding a similar office at Cambridge. He is the author of monographs on the buffalo, pinnipeds, rodentia, etc., of high scientific and literary value.

ALLEN, SAMUEL, 1636-1705; a London merchant, who bought a large tract in New Hampshire, including Portsmouth, and extending 60 m. inland, which purchase caused a lawsuit with the actual settlers that lasted until A.'s family became extinct. He acted as governor of New Hampshire until the arrival of the earl of Bellamont in 1699.

ALLEN, WILLIAM, 1770-1843; an English chemist, lecturer in Guy's Hospital, fellow of the royal society, and one of the founders of the pharmaceutical society. With Mr. Pepys he established the proportion of carbon in carbonic acid, and showed that the diamond was pure carbon.

ALLEN, WILLIAM, 1806-79; b. N. C. He studied law, and became partner of co-King, son of Rufus King, of New York. He settled at Chillicothe, O., and was twice elected to congress by the democrats, but was beaten in the third trial. He was elected senator from Ohio and took his seat, March 4, 1837, and was re-elected six

years later. In 1848, he was offered the nomination for president, but declined it on the ground that he was pledged to Gen. Cass. In 1873, he was elected governor of Ohio. In the last year or two of his life he became prominent as an advocate of "soft money" or greenbacks, and was credited with originating what was inaptly styled "the Ohio idea" in national finance.

ALLEN, WILLIAM, D.D., 1784-1868; b. Mass.; a graduate of Harvard in 1802; licensed to preach in 1804. He preached in western New York, became regent and assistant librarian in Harvard college, at which time he prepared his *American Biographical and Historical Dictionary*, the first work of general biography published in the United States. The third edition has notices of nearly 7000 Americans, while the first edition has only 700. In 1810, he became his father's successor in the pulpit in Pittsfield. He was president of Dartmouth college in 1817; from 1820 to 1839, president of Bowdoin college. He spent his later life in literary work, publishing *Junius Unmasked*, *Accounts of Shipwrecks, Psalms and Hymns*, *Christian Sonnets*, *Poems of Nazareth and the Cross*, *Winnissoo, or the Vale of the Hoosatunnuk*, etc. He was a philologist, and contributed many thousands of words to Webster's and Worcester's dictionaries.

ALLEN, WILLIAM HENRY, 1784-1813; b. R. I. He was in the American navy as a lieutenant on the frigate *United States* in the action with the *Macedonian*, Oct. 25, 1812, in which the latter was captured. Afterwards he commanded the brig *Argus*, cruising off England in 1813, and capturing \$2,000,000 worth of property, until, Aug. 14, he encountered the British brig *Pelican*, and lost his own vessel, and died the next day of wounds received in the fight.

ALLEN, WILLIAM HENRY, LL.D., b. Me., 1808; a graduate of Bowdoin college in 1833; Latin teacher in Cazenovia, N. Y., seminary, 1833-36; professor of natural philosophy and chemistry in Dickinson college, Carlisle, Pa., 1836-46; professor of philosophy and English literature in the same, 1846-49; and acting president, 1847-48; president of Girard college, Philadelphia, 1849-62; and for one year president of Pennsylvania agricultural college. In 1867, he returned to Girard college as president. In 1872, he was chosen president of the American Bible society. He d. 1882.

ALLENTOWN, city and co. seat of Lehigh county, Pennsylvania, on the Lehigh river and canal, 60 miles northwest of Philadelphia, and on the Lehigh Valley, Central of New Jersey, Philadelphia and Reading, and Allentown Terminal railroads. The place was settled in 1762, and called Northampton until 1836, when its name was changed to Allentown by act of legislature. It is one of the largest producers of furniture in the United States, and has extensive manufactures of pig, forged and rolled iron, silk, shoes, hosiery, wire, etc. Muhlenberg college (Luth.) is established here (170 students and a library of 9000 vols. in 1894), also Allentown College for Women, and a business college. There are churches, national banks, public schools, a high school, libraries, and daily and weekly newspapers. Population, 1880, 18,063; 1890, 25,228.

ALLERTON, ISAAC, about 1583-1659; one of the Plymouth pilgrims in the *Mayflower*; at first he had much influence, but he became unpopular and removed to New York, where he was for some time a merchant of note. He was married three times.

ALLES'TREE or **ALLES'TRY, RICHARD, D.D., 1619-81;** an English divine; moderate in philosophy; canon of Christ's church, Oxford; doctor of divinity; chaplain-in-ordinary to the king, and regius professor of divinity. He served with distinction in the royalist army, undergoing much suffering and imprisonment for his devotion to the royal cause. He built a portion of Eton college and Christ church grammar school.

ALLEYN, EDWARD, a distinguished actor, the contemporary and friend of Shakespeare, was born in 1566, and died in 1626. His connection with the English stage during the period of its highest prosperity invests his life with interest to the student of literary history; but it is as the munificent and pious founder of Dulwich college (q. v.) that he principally claims the remembrance of posterity. The building of the college was begun in 1613, and in 1619 the institution obtained the royal charter, after some obstruction on the part of lord Bacon, who wished the king to apply part of the grant to the foundation of two lectureships at Oxford and Cambridge.

ALL FOOL'S DAY. See APRIL.

ALL/GAIER, JOHANN, d. Prague, 1826; a German chess-player and writer. He was captain in the Austrian service, and lived chiefly in Vienna. His name is preserved in the "Allgaier gambit," a chess opening which he devised.

ALL-HALLOW. See ALL SAINTS' DAY.

AL/LIA, a small stream which fell into the Tiber, 11 m. n. of Rome. It is celebrated as the scene of the defeat of the Roman army by the Gauls under Brennus in 387, or, according to others, 390 B.C. Immediately afterwards, Rome was taken, plundered, and burnt. It is difficult to identify the A. with any of the modern streams; but the evidence seems in favor of the *Scolo del Casale*.

ALLIACEOUS PLANTS are those of the genus *allium* (q.v.), or others nearly allied to it. The term is generally employed to denote not only the possession of certain botanical characters, but also of a certain smell and taste, well known by the term *alliaceous*, and of which examples are readily found in the onion, leek, garlic, and other familiar species of *allium*, much employed for culinary purposes. These plants contain free phosphoric acid, and a sulphureted oil, which is partly dissipated in boiling or roasting. The A. flavor is, however, found also, although in comparatively rare instances,

in plants of entirely different botanical affinities—for example, in *alliaría officinalis*, of the natural order *cruciferae* (see ALLIARIA), in the young shoots of *cedrela angustifolia*, a tropical American tree of the natural order *cedrelaceae*, allied to mahogany; and in certain species of *dysoxylon* and *hartighsea*, of the kindred order *meliceae*, the fruit of which is used instead of garlic by the mountaineers of Java.

ALLIANCE, a compact between independent families or nations. See TREATY, HOLY ALLIANCE, TRIPLE ALLIANCE.

ALLIANCE, a city in Stark county, Ohio, on the Mahoning river, on the Alliance and Northern, the Lake Erie, Alliance and Southern, and the Penn. company's railroads; fifty-seven miles south-southeast from Cleveland. It has newspapers, banks, churches, high school, a college, and libraries; manufactures engines, steam hammers, boilers, etc., and has a large steel plant. The town has electric street-cars. Mount Union College, one mile distant, is an excellent institution. Population 1890, 7607.

ALLIANCE, FARMERS'. See FARMERS' ALLIANCE.

ALLIARIA, a genus of plants of the natural order *cruciferae* (q.v.), closely allied to *sisymbrium* and *erysimum*, but differing from both in having the stalks of the seeds flat and winged. The best known species is *A. officinalis* (*erysimum* A. of Linnaeus, and ranked by some botanists in the genus *sisymbrium*), known by the popular names of sauce-alone and jack-by-the-hedge. It is a native of Britain, not unfrequently found on hedge-banks and in waste places in dry rich soils, and is common in most parts of Europe. It is a biennial, with a stem 2 to 3 feet high; large, stalked, heart-shaped leaves; white flowers, and pods much longer than their stalks, which are somewhat spreading. It seems more deserving of cultivation than many other plants which have long received the constant care of the gardener, being wholesome, nutritious, and to most persons, pleasant. The powdered seeds were formerly employed as a sternutatory.

ALLIBONE, SAMUEL AUSTIN, LL.D., b. 1816; an American bibliographer, compiler of *A Critical Dictionary of English Literature, and British and American Authors, Living and Deceased, from the earliest accounts to the latter half of the Nineteenth Century*, with notices of 46,499 writers; contributor to various periodicals. In 1876 he published two volumes of English quotations, one of prose and one of verse. He was librarian of the Lenox Library, New York, from 1879 till his death in 1889.

ALLICE, or ALLIS. See SHAD.

ALLIER, a river in France, a tributary of the Loire, has its source in the water-shed of the e. of the department of Lozère; flows with a northerly course through Haute-Loire, Puy-de-Dôme, and Allier; and after a course of more than 200 m., falls into the Loire below the t. of Nevers. It is navigable for a considerable portion of its length.

ALLIER, a department in the center of France, has an area of 2810 sq. m., and a pop. of (96) 424,378. It is a hilly district, especially in the s., sloping down towards the river Loire in the n., and is partly woody, but generally well cultivated, producing the usual kinds of grain with wine and oil. It is also rich in minerals, especially iron, coal, anti ony, manganese, and marble. There is some manufacturing industry in cotton, wool, linen, carpets, pottery, and glass; but the majority of the population is engaged in agriculture. Mineral springs are found at Vichy, Neris, and Bourbon-l'Archanbault. The chief t. is Moulins. Other important places are Montluçon, La Palisse, Gannat. At Chantelle-le-Chateau are the extensive ruins of King Pepin's castle.

ALLIGATION, from a Latin word signifying "to bind together," is a rule in arithmetic which teaches to solve such questions as the following: 3 lbs. of sugar at 6d. are mixed with 5 lbs. at 10d.; what is the price of a pound of the mixture? or: In what proportion must sugar at 6d. be mixed with sugar at 10d., to produce a mixture at 8½d.?

The solution of the first is $\frac{3 \times 6 + 5 \times 10}{3 + 5} = 8\frac{1}{2}d.$

In the second, the proportional number for one ingredient is the difference between the price of the other and that of the mixture; the number for the cheap sugar is therefore 1½, and for the dear, 2½, which are as 3:5, so that there must be 3 lbs. at 6d. for every 5 lbs. at 10d. If there are more than two ingredients, the problem becomes indeterminate; that is, it admits of a variety of answers. Thus: Of three metals, whose specific gravities are 10, 15, and 16, it is required to compose an alloy, whose specific gravity shall be 14. The conditions will be answered by mixing them in any of the following proportions: 1, 2, 1; 2, 2, 3; 6, 2, 11, etc.

ALLIGATOR, a genus of saurian reptiles, of the family of the *crocodilidae*, and still regarded by some naturalists as a mere sub-genus of *crocodilus*; although it has recently been proposed to constitute a family or sub-family of *alligatoridae*, and to divide it into the genera *jacare*, *alligator*, and *caiman*. The alligators differ from the true crocodiles in the shorter and flatter head, the existence of cavities or pits in the upper jaw, into which (and not into mere notches between the teeth, as in the crocodiles) the long fourth teeth of the under jaw are received, and the much less webbed feet. In consequence of the different manner in which provision is made in the upper jaw for the reception of the longest teeth of the lower, the head of the alligators is broader and the snout more obtuse than in the crocodiles. Their habits are less perfectly aquatic; they frequent swamps and marshes, and may be seen basking on the dry ground during the day, in the heat of

the sun. They are most active during the night, and then make a loud bellowing. They have great strength in their tails, with which the larger ones can easily upset a light canoe. They feed chiefly on fish, but do not object to other animal food. The females lay their eggs, 20 to 60 in number, in the mud, and leave them to be hatched by the heat of the sun, but keep watch over the spot, and show much affection for their young ones, many of which, however, fall a prey to the old males, and to vultures and fishes. There are several species, varying from 2 to 20 ft. and upwards in length. Perhaps the most fierce and dangerous is that found in the southern parts of the United States, as far up the Mississippi as the Red river, *A. lucius*. The snout is a little turned up; and its resemblance to that of a pike has led to the specific name *lucius*. In cold weather, these animals bury themselves in the mud, and become so torpid, that they may be cut to pieces without showing signs of sensibility; but a few hours of bright sunshine are enough to revive them. Like the other species, they are so protected by their mailed plates, that they are not easily killed, except by a shot or blow over the eyes. A very strong kind of leather is prepared from the skin, which is used for making saddles. It is said that a considerable quantity of oil can be extracted from an A., which is transparent and burns well. The alligators of South America are there very often called *caymans*, probably an Indian name, and some of them bear the name of *yucaré*, particularly *A. sclerops*, also distinguished as the spectacled cayman, on account of a prominent bony rim surrounding the orbit of each eye. This species appears to be widely distributed over tropical America, and attains a great size. Alligators are not known to exist in any quarter of the world except America, in which, however, true crocodiles are also found. But among the fossils of the s. of England are remains of a true A. (*A. hantoniensis*) in the Hordle beds. The flesh of alligators is eaten by Indians and negroes. It has a musky flavor.—The origin of the name is uncertain, but it is supposed to be a corruption of the Portuguese *lagarto*, a lizard. Cuvier adopted it as a scientific name.

ALLIGATOR APPLE. See CUSTARD APPLE.

ALLIGATOR PEAR. See AVOCADO PEAR.

ALLISON, WILLIAM B., b. Perry, O., 1829; studied law, and removed to Iowa; in 1857 became a republican leader; served in the house of representatives, 1863–71; was elected to the U. S. senate, 1872, re-elected, 1878 and 1884.

ALLITERATION is the frequent occurrence in a composition of words beginning with the same letter. In old German, Anglo-Saxon, and Scandinavian poetry, A. took the place of rhyme. This kind of verse, in its strict form, required that in the two short lines forming a couplet, three words should begin with the same letter, two in the first line or hemistich, and one in the second; as in the following couplet of Anglo-Saxon poetry:

*Firum foldan
Frea almihtig.—Cædmon.*

A. has not quite disappeared from Icelandic poetry to this day. Alliterative poems continued to be written in English after it had assumed its modern form; the most remarkable is *Pierce Plowman*, a poem of the 14th c., of which the following is a specimen, the two hemistichs being written in one line:

*Mercy hight that maid, | a meek thing withal,
A full benign burd, | and buxom of speech.*

Even after the introduction of rhyme, A. continued to be largely used as an embellishment of poetry, and is so, though to a less extent, to this day:

*The fair breeze blew, the white foam flew,
The furrow followed free.—Coleridge.*

Besides the Gothic, there are other nations widely separated from each other, among whom the essential distinction of verse is A.; the Finns, for instance, and the Tamils in the s. of India.

But A. is not confined to verse; the charm that lies in it exercises great influence on human speech generally, as may be seen in many current phrases and proverbs in all languages: Ex., "life and limb," "house and home," "wide wears, tight tears," etc. It often constitutes part of the point and piquancy of witty writing. Among modern writers this application of A. is perhaps most felicitously exemplified by Sidney Smith, as, when in contrasting the conditions of a dignitary of the English church and of a poor curate, he speaks of them as "the right reverend Dives in the palace, and Lazarus-in-orders at the gate, doctored by dogs and comforted with crumbs."

In the early part of the 17th c., the fashion of hunting after alliterations was carried to an absurd excess; even from the pulpit, the chosen people of God were addressed as "the chickens of the church, the sparrows of the spirit, and the sweet swallows of salvation." *Ane New-Year Gift*, or address, presented to Mary queen of Scots by the poet, Alexander Scott, concludes with a stanza running thus:

*Fresh, fulgent, flourist, fragrant flower formose,
Lantern to love, of ladies lamp and lot,
Cherry maist chaste, chief carbuncle and chose, etc.*

In the following piece of elaborate trifling, given (but without naming the author) in H. Southgate's *Many Thoughts on Many Things*, alliteration is combined with acrosticism:

A n Austrian army, awfully arrayed,
B oldly by battery besieged Belgrade;
C ossack commanders cannonading come,
D ealing destruction's devastating doom;
E very endeavor engineers essay
F or fame, for fortune, forming furious fray.
G aunt gunners grapple, giving gashes good;
H eaves high his head heroic hardihood;
I braham, Islam, Ismael, imps in ill,
J ostle John Jarovlitz, Jem, Joe, Jack, Jill;
K ick kindling Kutusoff, kings' kinsmen kill
L abor low levels loftiest, longest lines;
M en march 'mid moles, 'mid mounds, 'mid murd'rous mines.
N ow nightfall's near, now needful nature nods,
O pposed, opposing, overcoming odds.
P oor peasants, partly purchased, partly pressed,
Q uite quaking, "Quarter! quarter!" quickly quest.
R eason returns, recalls redundant rage,
S aves sinking soldiers, softens signiors sage.
T ruce, Turkey, truce! truce, treach'rous Tartar train!
U nwise, unjust, unmerciful Ukraine,
V anish, vile vengeance! vanish, victory vain!
W isdom wails war—walls warring words. What were
X erxes, Xantippe, Ximenes, Xavier?
Y et Yassy's youth, ye yield your youthful yest.
Z ealously, zanies, zealously, zeal's zest.

AL'LUM, a genus of plants of the natural order *liliaceæ* (q.v.) containing a large number of species, perennial—more rarely biennial—herbaceous plants, more or less decidedly bulbous-rooted, natives chiefly of the temperate and colder regions of the northern hemisphere. The flowers are umbellate, inclosed in a spathe, and the umbel often bears also small bulbs along with its flowers. The perianth is of six-spreading pieces, resembling petals, having the stamens inserted in their base. The fruit is a triangular capsule, and the seeds are angular. The leaves are generally narrow, although in some species, as *A. ursinum*, they are rather broad, and in a considerable number they are rounded and fistulose. GARLIC (q.v.), ONION (q.v.), LEEK (q.v.), SHALLOT (q.v.), CHIVE (q.v.), and ROCAMBOLE (q.v.), are species of this genus in common cultivation. The first four are cultivated in the gardens of India as well as of Europe, along with *A. tuberosum*; and the hill-people of India eat the bulbs of *A. leptophyllum*, and dry the leaves, and preserve them as a condiment. A number of other species are occasionally used in different countries.—Eight or nine species are natives of Britain, of which the most common is RAMSONS (*A. ursinum*), a species with much broader leaves than most of its congeners. It is most frequently found in moist woods and hedgebanks; but occasionally in pastures, in which it proves a troublesome weed, communicating its powerful odor of garlic to the whole dairy produce. Crow garlic (*A. vineale*), another British species, is sometimes very troublesome in the same way, in drier pastures. Both are perennial, and to get rid of them their bulbs must be perseveringly rooted out, when the leaves begin to appear in spring.

ALLIX, PIERRE, 1641-1717; a divine of the French Reformed Church, pastor at Charenton, near Paris. After the revocation of the edict of Nantes he went to London, where he opened a church for French exiles, in which the service was in that language but according to the English ritual. He wrote much, chiefly controversial works. His learning was great.

AL'LOA, a seaport t. in Clackmannanshire, Scotland, is situated on the left bank of the Forth, where the river widens into its estuary, 7 m. (by road) below Stirling. Population, 12,643. It is a t. of considerable antiquity, and is an active center of trade and manufactures. The principal articles manufactured are whisky and oil, the latter of which is highly esteemed. There are extensive glass, iron, and brick works, and ship-building yards. Copper utensils, shawls and blankets, leather, tobacco, and snuff are manufactured to a considerable extent; and a large quantity of coal is regularly exported from the pits in the immediate neighborhood of the t. The latter forms one of the chief items in the coasting trade, besides which there is a considerable foreign trade, chiefly outwards. The port has a wet dock. The harbor is good, with 13½ ft. of water at neap and 17½ at spring tides; it is furnished with a dry dock. There is a steamboat ferry across the Forth, connecting the t. by a short junction line with the Scottish Central railway. It is also connected with that line, and with the Edinburgh and Northern railway, by the Stirling and Dunfermline branch. There is regular steam-communication by the river with Edinburgh and Stirling. In the neighborhood is Alloa House, the seat of the Earl of Mar and Killie, with Alloa tower, 89 ft. high, supposed to have been built in the 13th c., once the residence of the Erskines, and at different times of Scottish princes.

ALLOB'ROGES, a people of Gaul whose territory is now Savoy and Dauphin. Vienna (the modern Vienne) was their chief town. They were subjected to Rome, 121 B.C., by Fabius Maximus, and remained loyal.

ALLÔCUTION, which simply means an "address," is applied, in the language of the Vatican, to denote specially the address delivered by the pope at the college of cardinals on any ecclesiastical or political circumstance. It may be considered as corresponding in some measure to the official explanations which constitutional ministers give when questions are asked in parliament, or to the political messages of the French emperor. The court of Rome makes abundant use of this method of address, when it desires to guard a principle which it is compelled to give up in a particular case, or to reserve a claim for the future which has no chance of recognition in the present.

ALLO'DIUM, or **ALLODIAL TENURE** (in law), is the free and absolute right of property in land, independent of any burden of homage or fidelity to a superior. When the principal land-holders of England submitted to the yoke of military tenure, and surrendered their lands into the hands of the conqueror at the council of Sarum, feudality, the previous existence or non-existence of which has been a subject of much discussion, was formally recognized, and it henceforth became a fundamental maxim in the law of real property, that "the king is the universal lord and original proprietor of all the lands in his kingdom, and that no man doth or can possess any part of it, but what has mediately or immediately been derived as a gift from him, to be held upon feudal services" (Blackstone, vol. ii. p. 51, Kerr's edition). This maxim, though, as Blackstone remarks, it was even at first little more than a fiction, was not peculiar to England, but prevailed wherever the feudal system obtained, and still forms what may be called the starting-point in all feudal tenures of land. Even where subinfeudations have prevailed to the greatest extent, every title is traceable, in the last instance, to the paramount and universal superiority of the crown. See **FEUDAL SYSTEM**. The surrender of lands in England being the result of political measures, was one universal national act, and, consequently, allodial tenures at once ceased to exist; but in many other countries it was accomplished by private arrangements between the allodial proprietors and the prince, the former being anxious to exchange their normal independence for the greater security enjoyed by the vassals of the sovereign, the latter being willing to receive them as dependents, for the sake either of their personal services in war, or, latterly, for the equivalents of these services in money or the produce of the lands. In such countries, feudality, though general, was not universal; and allodial tenures consequently continued to subsist alongside of those originating with the crown. In this position was Denmark, and it is curious that the only examples of allodial tenures to be met with in Great Britain are the Udal rights in the islands of Orkney and Shetland, which formerly belonged to that country. "When these islands," says Mr. Erskine, "were first transferred from the crown of Denmark to that of Scotland, the right of their lands was held by natural possession, and might be proved by witnesses, without any title in writing, which had probably been their law formerly while they were subject to Denmark; and to this day, the lands, the proprietors of which have never applied to the sovereign, or those deriving right from him, for charters, are enjoyed in this manner." By the law of Scotland, all property and superiorities belonging to the crown itself, and all churches, churchyards, manse, and glebes, the right to which does not flow from the crown, are regarded as allodial; and the term in a wider sense, as opposed to *feudal* generally, is sometimes used with reference to movable property.

The etymology of the word *A.* has been much discussed, and both Celtic and Teutonic origins have been assigned to it. The latter seem the more probable conjectures, as the word, in senses closely resembling that which we attach to it, is to be found in all Scandinavian and Germanic languages. On this supposition, its derivation from *all* (all, or wholly) and *od* (property), seems probable. Another conjecture assigns it to *all* and *oede* (waste). That adopted by Mr. Erskine, of its having been composed of a privative, and *leude* or *leute*, people (taken from the people), seems wholly inadmissible, as being inconsistent with the forms of Teutonic speech.

ALLONGÉ, AUGUSTE, b. Paris, 1833; artist; pupil of M. L. Cogniet. He has been called "one of the kings of charcoal," his best-known works having been done in that material. These generally represent landscapes with water, as in his "Brook in Morvan" and "Mill of the Soucy." His little book, *Charcoal Drawing*, is an authority in its department.

ALLOPATHY. See **HOMEOPATHY**.

ALLO'RI, CRISTOFANO, 1577-1621: a Florentine painter, son of Alessandro. He studied with Pagani, and became one of the foremost of the Florentine school. His pictures are distinguished by their close adherence to nature, and for delicacy and technical perfection of execution. His finest work is "Judith and Holofernes" in the Pitti palace, the model for "Judith" having been the beautiful Mazzafirra, the artist's mistress.

ALLOTMENT OF LAND, although not a technical, is a well-understood expression in the law of England; and under the general inclosure act (41 Geo. III., c. 109), is used to denote the kind of conveyance or distribution directed to be made to the person or persons who at the time of the division and inclosure shall have the actual possession of the lands, tenements, or hereditaments, in lieu of, or in right of which the allotment is made, but without prejudice to any question of title. By the ancient statute of Merton (20 Henry III., c. 4), the lord of the manor, or any other owner of a common, may inclose so much of the waste as he pleases for tillage or wood-ground, provided sufficient is left for other parties entitled to the use of the same. This right to inclose common fields

and waste lands has in modern times been very generally extended throughout England by means of local acts of parliament, a number of the regulations of which have been consolidated by the act above referred to, by section 7 of which commissioners are appointed to make the allotment.

ALLOTROPY is the term applied in chemistry to the existence of the same element in various forms, each of which, though containing no extraneous substance, possesses different properties from the others. The various conditions in which a single element can be obtained are known as its allotropic modifications, and though as yet only a few elementary substances have been observed to exhibit such modifications, yet it is generally believed that every element is capable of existing in several allotropic forms. Phosphorus affords an excellent illustration of this doctrine. In ordinary circumstances, and when freshly prepared, phosphorus is a pale, yellow solid, of the consistence and aspect of wax, and to some extent flexible and translucent. It requires to be placed in a vessel with water to keep it from taking fire spontaneously. At any ordinary natural temperature it appears luminous, and evolves an alliaceous odor when exposed to air, owing to a slow process of combustion taking place; when warmed to 140° F. (60° C.), it bursts into flame, and burns vividly. Common phosphorus is soluble in alcohol, ether, the fixed and volatile oils, and especially in bisulphuret of carbon, 100 parts of which, when warm, dissolve 20 parts of phosphorus. But the same element, when dried and kept for some days, with little or no access of air, at a temperature ranging from 446° to 482° F. (230° to 250° C.), passes, weight for weight—without addition or subtraction of matter—into a substance known to chemists as *amorphous* phosphorus. The color of this new variety is scarlet, brownish red, or even blackish red; and it exists as a powder or cake, which does not evolve any odor, or readily take fire, and therefore needs not to be preserved under water. Heated to 140° F. (60° C.), or to a little short of 482° F. (250° C.), it refuses to burn; and, in fact, it is questionable if phosphorus in this condition will take fire at all; though at 482° , and above, the red variety passes back again to the ordinary or yellow phosphorus, and then bursts into flame. Moreover, amorphous phosphorus is insoluble in alcohol, ether, the fixed and volatile oils, and even in bisulphuret of carbon. Probably the most striking difference between these two forms of the same substance is, that ordinary phosphorus is a deadly poison, as is too often evidenced in the death of children from sucking the ends of lucifer-matches; whilst the red or amorphous phosphorus is not known to be poisonous at all.—Besides the two varieties already mentioned, and which are best known, there are *black phosphorus*, *white phosphorus*, and *scaly phosphorus*. The only manner of accounting for the difference of properties evinced by ordinary and red phosphorus, is to refer the change to an absorption of heat during the passage of the ordinary into the red variety. It is an observed fact that such absorption or disappearance of heat does then take place; whilst, when the red phosphorus is heated till it passes back to the ordinary kind, a very rapid disengagement of heat occurs.

Sulphur furnishes another example of A. In the ordinary condition of roll-sulphur, it is a pale, yellow, brittle, crystalline solid; insipid to taste, odorless when cold, and evolving a peculiar odor when heated or rubbed. It dissolves in small quantity in turpentine and the fixed oils, and to the extent of 35 per cent in bisulphuret of carbon. Common sulphur heated to 232° F. (111° C.) fuses, and forms a thin, yellow, limpid liquid like olive-oil; at 480° F. (249° C.) it passes into a thick, dark-brown, viscid liquid, resembling ordinary treacle; and if, at this stage, it is poured into water, the sulphur forms itself into a thread-like mass or net-work, possessing great elasticity, like india-rubber, not at all brittle, and so soft that it can be molded by the fingers into casts and seals. Again, this elastic form of sulphur is not soluble in turpentine and the fixed oils, or even in bisulphuret of carbon. There are also other allotropic forms of sulphur.

Oxygen may be taken as a third illustration of the same doctrine. In the ordinary form in which oxygen exists in the atmosphere and elsewhere, it is a gas with no odor, no bleaching properties, and no disinfectant powers. To a certain extent it oxidizes metals, etc.; but feebly, as compared with its allotropic form, ozone. By several processes—viz., the introduction of a heated glass rod into a jar containing ordinary air and a little ether; or the presence of clean-scraped sticks of phosphorus in a glass vessel with a confined portion of air; or the passage of electric discharges through or round a glass tube or bottle with air—the oxygen of the atmospheric air is transformed into an allotropic form called *ozone*. In the latter condition, oxygen possesses a very strong and peculiar odor, long known as the electrical odor; has great bleaching powers, and is regarded as the agent in the air which bleaches clothes on the household bleaching-green; and possesses such powerful disinfecting properties, that tainted meat introduced into ozonized air has the disagreeable odor destroyed, and smells fresh when taken out. Ozone is doubtless the great natural agent which removes many deleterious gases and vapors, and destroys infectious matter floating in or diffused through the air. See *OZONE*.

ALL'OTTAVA (Italian), in the octave. A passage marked *all. 8va.*, or *8va.*, and placed over the notes in pianoforte music signifies that the phrase is to be played an octave higher than written, or, if placed below the notes, an octave lower. Its duration is indicated by a dotted line, and when the music is to be played as written, the Italian word *loco* (in its place) is printed over or under the music. In orchestral scores, or manuscripts, *all 8va.* signifies that one instrument plays in octaves with another.

Occurring in figured bass, the term shows that no harmonies are to be employed, the upper parts simply doubling the bass in octaves.

ALLOUEZ, CLAUDE JEAN, 1620-90; one of the early Jesuits who visited the American lakes; trained in work in the Algonquin missions on the St. Lawrence. He founded the mission of the Holy Ghost on lake Superior in 1665, explored Green Bay, and established missions among the Illinois Indians, settling at Kaskaskia and continuing the mission begun by Marquette; but he retired in 1679 on the approach of La Salle, an enemy of the Jesuits. He died among the Miamis on St. Joseph's river. A contributed much valuable matter to Indian history.

ALLOWANCES, OFFICERS'. At all posts and stations where there are public quarters in buildings belonging to the United States officers are furnished with quarters, each one being allotted the number of rooms to which his rank entitles him. If the quarters are insufficient those necessary are hired. An officer can select quarters occupied by a junior, but, having made his choice, he must abide by it, and cannot again at the post displace a junior unless he himself is displaced by a senior. A room is set aside as a mess-room when a majority of officers at a post unite in a mess, but never when the officers to be accommodated are less than three in number.

A certain quantity of fuel is allowed, which is paid for at the rate of three dollars a cord of standard oak wood, or its equivalent in other kinds of fuel. For any additional quantity than that allowed the contract price is paid, or three dollars per cord if the contract price is less than three dollars. One sixth of the allowance of fuel can be taken in kindling wood if desired. If at a military post between the 36th and 43d degrees of latitude the mean temperature for twenty consecutive days in a month is not above 20° F. an increase of fuel of one third the usual quantity is allowed. Officers can buy at the Quartermaster's Department lamps, oil, wicks, and chimneys.

Stationery is also allowed officers in quantities depending upon the rank and employment of the officer. The price paid for a horse purchased by an officer shall be its cost to government when that can be ascertained; if this is not possible, then the price shall be the average yearly cost of government horses for the previous year. All officers are, as a rule, required to keep the private horses necessary for the efficient performance of their duties. Horses of mounted officers can be shod at government expense by public blacksmiths, but government will not pay for shoeing done by private parties. Forage is allowed for horses owned and actually kept in the performance of official duties, and for the following number of horses: To the lieutenant-general, 4; major-general or brigadier-general, 3; colonel, lieutenant-colonel, major, captain or lieutenant, mounted, and adjutant and regimental quartermaster, each 2. One hundred pounds of straw per month is allowed for bedding for each horse. When troops are moved transportation is provided for the whole command. On transports cabin passage is provided for officers, and reasonable and proper accommodation for the troops. When practicable a separate apartment is set aside for the sick. Officers traveling at public expense are allowed 150 pounds of baggage, but when mileage is drawn the expenses of baggage transportation are borne by the individual.

In changing stations the baggage to be transported at public expense, including mess-chests and personal baggage, cannot exceed the following amount: Major-general, 2500 lbs., brigadier-general, 2000 lbs., field officers, 1800 lbs., captain, 1500 lbs., first lieutenant, 1300 lbs., second lieutenant, 1200 lbs., which allowances are in excess of the weight transported free of charge under the regular fares by public carriers.

AL'LOWAY KIRK, an old ruined church in the parish of Ayr, near the mouth of the Doon, celebrated in Burns's *Tam o' Shanter*. At very short distances from it are the cottage in which the poet was born, the monument erected to his memory in 1823, and "the Auld Brig o' Doon," over which Tam o' Shanter made his escape.

ALLOY (in chemistry) is a mixture of two or more metals, either natural, or produced artificially by melting them together. The A., or mixture, has often different properties from the component metals, and bears a distinct name. Thus, bell-metal is an A. of copper and tin; tombak, of copper and zinc; brass, of copper, with a larger proportion of zinc, etc. Alloys are generally harder than the metals that compose them, and this is the motive for alloying the precious metals. Both gold and silver, when pure, are very soft, and easily worn away by use; and therefore, a certain proportion of copper is added, to give these metals the requisite hardness. In this case the word "alloy" signifies the inferior metal added, and not the mixture. For coin, the proportion of copper to be added is fixed by law (see the following article), and differs in different states. It has been found by experiment that $\frac{1}{10}$ of A. gives the greatest durability. This is exactly the proportion in British gold coin, a pound troy of the metal containing 11 parts gold and 1 part copper. The A. in the silver coin is somewhat less, being 18 dwts. in the pound instead of 20 dwts. For convenience in reckoning, the standard of the coinage in France, and other countries that adopt its monetary system, as well as in the United States, is made $\frac{1}{10}$ pure metal and $\frac{9}{10}$ A., usually stated 900 (in 1000) parts fine. Brit. gold and silver standards similarly stated would be 917 and 925 respectively. Gold is sometimes alloyed with silver, or with a mixture of silver and copper. The color of gold and silver is affected by the nature and amount of the A. A strong A. of copper makes gold red; of silver, green; and a still stronger of silver, a bright yellow. A compound of mercury with another metal is an *amalgam* (q.v.).

Alloys seldom possess the density which theory or calculation from the specific gravity

of their constituents would indicate. Thus, many alloys possess a greater density than the mean density of their constituents, whilst others have a less density. The increase in density of the A. indicates that the metals have contracted; in other words, that the metallic molecules have approached each other more closely; whilst the decrease in density denotes a separation of the molecules to greater distances from each other.

ALLOYS

which exhibit a greater density than the mean density of the metals composing them.

Gold	and zinc.
"	" tin.
"	" bismuth.
"	" antimony.
"	" cobalt.
Silver	" zinc.
"	" tin.
"	" bismuth.
"	" antimony.
Copper	" zinc.
"	" tin.
"	" palladium.
"	" bismuth.
Lead	" antimony.
Platinum and molybdenum.	
Palladium	" bismuth.

ALLOYS

which possess a less density than the mean density of the metals composing them.

Gold	and silver.
"	" iron.
"	" lead.
"	" copper.
"	" iridium.
"	" nickel.
Silver	" copper.
Iron	" bismuth.
"	" antimony.
"	" lead.
Tin	" lead.
"	" palladium.
"	" antimony.
Nickel	" silver.
Zinc	" antimony.

The strength or cohesion of an A. is generally greater than that of the mean cohesion of the metals contained therein, or even of that of the most cohesive of its constituents. Thus, the breaking weight of a bar of copper or tin (meaning the longitudinal strain it can bear) is very much lower than the breaking weight of a bar composed of an A. of tin and copper. The following tables represent the

COHESION OF METALS.

Bar, 1 in. square, breaks with lbs.	Bar, 1 in. square, breaks with lbs.
Barbary copper..... 22,570	Malacca tin 3,211
Japan "..... 20,272	Bismuth 3,008
English block tin..... 6,650	Zinc 2,689
" " "..... 5,322	Antimony..... 1,060
Banca tin..... 3,679	Lead..... 885

When any two of the above metals combine together, they generally—though not always—yield an A. which is much stronger than we should expect; thus the

COHESION OF ALLOYS.

	Bar, 1 in. square, yields with lbs.
10 parts of copper and 1 part of tin.....	32,093
8 " " " 1 " " ".....	36,088
6 " " " 1 " " ".....	44,071
4 " " " 1 " " ".....	35,739
2 " " " 1 " " ".....	1,017
1 " " " 1 " " ".....	725
4 " English tin and 1 " lead.....	10,607
4 " banca " " 1 " antimony.....	13,480
4 " " " " 1 " bismuth.....	16,692
4 " English tin " 1 " zinc.....	10,258
4 " " " " 1 " antimony.....	11,323

The power of conducting electrical currents is not so great in an A. as the mean conducting power of its components.

The composition of the more commonly occurring and commercially important alloys is as follows: Plumber's solder, 2 tin and 1 lead; soft solder, 1 tin and 2 lead; common pewter, 4 tin and 1 lead; gun-metal, 9 copper and 1 tin; bronze, 9 copper and 1 tin and zinc; cymbals and Chinese gongs, 4 copper and 1 tin; bell-metal, 3 copper and 1 tin; speculum metal, 2 copper and 1 tin; pot-metal or cock-metal, 2 copper and 1 lead; gilding-metal, 16 copper and 1 to 1½ zinc; Mannheim gold—pinchbeck or bath-metal, 16 copper and 4 zinc; Bristol brass, for soldering, 16 copper and 6 zinc; ordinary brass, for casting, 16 copper and 8 zinc; Muntz sheathing-metal, 16 copper and 10½ zinc; spelter solder, for copper and iron, 16 copper and 12 zinc; spelter solder, for brass-work, 16 copper and 16 zinc; Mosaic gold, 16 copper and 16½ zinc; hardest silver solder, 4 silver and 1 copper;

hard silver solder, 3 silver and 1 copper; soft silver solder, 2 silver and 1 copper; German silver, 100 copper, 50 zinc, and 50 nickel; type-metal, ordinary, 15 lead, 4 antimony, and 1 tin, or 14 lead, 5 antimony, and 1 tin—small types, 4 lead and 1 antimony—large types, 6 lead and 1 antimony; stereotype metal, 48 lead, 6 antimony, and 1 tin; Britannia metal, 50 tin, 4 antimony, 4 bismuth, and 1 copper.

ALLRIGHT-ISLAND is one of a small group of islands known as the Magdalen Islands, and situated near the centre of the Gulf of St. Lawrence, though counted as a part of Gaspé Co., Quebec. The group are the property of the descendants of Admiral Coffin of the British navy. Area of the island, 8600 acres.

ALL-SAINTS' BAY, in the province of Bahia, Brazil, in 12°-13° s. lat., and 38°-39° w. long. It forms a superb natural harbor, in which the navies of the whole world might anchor. Its length from n. to s. is 37 m.; its breadth from e. to w. 27. It contains several islands, the largest of which, Itapascica, is 18 m. long and 3 broad. The entrance to the bay is easy. The t. of Bahia (q.v.) lies just within it, on the right hand.

ALL-SAINTS' DAY, in old English, All-Hallows, All-Hallowmas, or simply Hallowmas, a festival of the Roman Catholic church, introduced because of the impossibility of keeping a separate day for every saint. As early as the 4th c., on the cessation of the persecution of the Christians, the Sunday after Easter was appointed by the Greek church for commemorating the martyrs generally; and in the church of Rome a similar festival was introduced about 610 A.D., when the old heathen pantheon (the present rotunda, or Santa Maria del Martiri) was consecrated, on the 13th Mar., to Mary and all the Martyrs. But the real festival of All Saints was first regularly instituted by Gregory IV., in 835, and appointed to be celebrated on the 1st Nov. It was admitted into England about 870. The choice of the day was doubtless determined by the fact that Nov. 1, or rather the eve or night preceding it, was one of the four great festivals (1st Feb., 1st May, 1st Aug., and 1st Nov.) of the heathen nations of the north; for it was the policy of the church to supplant heathen by Christian observances. See BELTEIN and HALLOW-EVE.

ALLSOPP, SAMUEL, born in the year 1780, was a member of the great brewing establishment of Allsopp & Sons, at Burton-on-Trent, which ranks third among the brewing firms of the United Kingdom. He was a descendant of an old family, and was noted for the charities of his public and private life. On his death in 1888, he was succeeded in the business by his sons, Charles, James, and Henry, to the last of whom the modern development of the firm is chiefly due. He represented Worcestershire in Parliament (1874-80), and in 1880 was created a baronet. After his retirement from the firm he was raised to the peerage under the title of Lord Hindlip, of Hindlip, and Alsop-en-le-Dale. He died April 3, 1887. The three breweries of the Allsopps employ about 1600 workmen, and are connected with the malthouses and cooperages by ten miles of railway. A few years since when the business was organized as a limited company, it was valued at £3,300,000; and the shares were eagerly sought by capitalists for investments.

ALL SOULS' COLLEGE, Oxford, was founded in 1437 by Henry Chichele, sometime fellow of New college, and successively bishop of St. David's and archbishop of Canterbury, for a warden, 40 fellows, 2 chaplains, and clerks. However, by an ordinance framed by the commissioners appointed under the statute 17 and 18 Vict. c. 81, ten of the fellowships have been suppressed in order to the endowment of two professorships, to be called "the Chichele professorship of international law and diplomacy," and "the Chichele professorship of modern history." The remaining fellowships are open to all, irrespective of birth (date or place), position, or profession, provided only the candidates have passed all the examinations required for B.A., and have obtained either some prize or scholarship open to general competition, or a "first-class" place in one of the public examinations of the university. The candidates also must be examined in jurisprudence and modern history. The patronage includes 19 benefices, situated in Kent, Oxford, Essex, Gloucester, Berks, Bucks, Herts, Northampton, Salop, Surrey, and Wilts, of an annual value of \$7925. In 1891 this college had 40 members on its books.

ALL-SOULS'-DAY, a festival of the Roman Catholic church, which falls on the 2d of Nov. The object of it is by prayers and almsgiving to alleviate the sufferings of the souls in purgatory. It was first instituted in the monastery of Clugny, 993, and the following is the account given of the circumstance in which it originated: A pilgrim returning from the holy land was compelled by a storm to land on a rocky island somewhere between Sicily and Thessalonica. Here he found a hermit, who told him that among the cliffs of the island was situated the opening into the under-world, through which huge flames ascended, and the groans and cries of souls tormented by evil angels were audible. The hermit had also frequently heard the complaints and imprecations of the devils, at the number of souls that were torn from them by the prayers and alms of the pious; they were especially enraged, he said, against the abbot and monks of Clugny. The pilgrim on his arrival acquainted Odilo, abbot of Clugny, with what had come to his knowledge, and the abbot thereupon appointed the day after All Saints to be kept in his monastery as an annual festival for "all souls." The observance was quickly adopted by the whole Catholic world. By another account, the scene of the incident is transferred to Sicily, and the institution to the year 998.

In some parts of western England it is still "the custom for the village children to go round to all their neighbors *souling*, as they call it—collecting small contributions, and singing the following verses, taken down from two of the children themselves :

Soul! soul! for a soul-cake;
Pray, good mistress, for a soul-cake.
One for Peter, two for Paul,
Three for Them who made us all.

Soul! soul! for an apple or two;
If you've got no apples pears will do.
Up with your kettle, and down with your pan;
Give me a good big one, and I'll be gone.

The soul-cake referred to in the verses is a sort of bun, which, until lately, it was ^{an} almost general custom for people to make, and to give to one another on the 2d of November."

ALL SPICE, a name frequently given to the kind of spice called PIMENTA (q.v.) or Jamaica pepper, the fruit of *eugenia pimenta* and *E. acris*. The name originated in its being supposed to combine the flavour of different spices, particularly cinnamon, nutmeg, and cloves.—The name CAROLINA A., or AMERICAN A., is given to the aromatic bark of *calycanthus floridus* (see CALYCANTHUS), which is employed in the United States as a substitute for cinnamon.—The berries of *benzoin odoriferum*, natural order *lauraceæ*, are said to have been used for A. in the same country during the war with Great Britain.

ALL STON, WASHINGTON, one of the best known of the painters and poets of America, was b. at Waccamaw, S. C., in 1779. He at first prosecuted the study of medicine, but was afterwards induced, by his acquaintance with the painter Malbone, to devote himself to art. When he had completed his studies in America, he went to London, where he became a friend of his countryman West, who was at that time president of the academy. In the year 1804, he proceeded to Rome, where he lived for some years in the closest intimacy with J. Vanderlyn, Thorwaldsen, and Coleridge. After a short stay in America, to which he returned in 1809, he once more visited England in 1811, when he gained the 200-guinea prize of the British institution. In 1817, he went to Paris with Leslie, and the year after returned to America. In 1819, he was elected an associate of the Royal Academy of London. He now permanently fixed his residence at Cambridgeport, near Boston, where he lived, cultivating his art and the muses, till his death on the 9th of July, 1843. His pictures are very numerous. The subjects of them are mostly taken from scripture, such as Jacob's dream, Elijah in the wilderness, Saul and the witch of Endor, the deliverance of Peter out of prison, etc. The style of A. is noble, his ideas are imaginative, and many of his paintings evince a true poetic spirit. In coloring, he comes nearer the old masters than most modern painters do. Among his printed works, the most remarkable is the poem, *The Sylphs of the Seasons* (London, 1813), and the art-novel, *Monaldi* (Boston, 1841). His *Lectures on Art* appeared posthumously (1850). See *Life* by Flagg (1892).

ALL-THE-TALENTS-MINISTRY. Lord Grenville's administration, formed after the death of William Pitt, was by its friends claimed as possessing "all the talents," and this phrase, thrown back in derision by opponents, clung to it ever afterwards as an appellation.

ALLUVION. This is a legal term signifying land gained from the sea or other body of water by the washing up of sand and earth so as to make it *terra firma*. The right of property thus arising is regulated as follows in the laws of England and the United States. The land created by the action of the tide belongs to the owner of the estate to which it has been added, but it must be the result of a gradual and imperceptible increase, whether on the shores of the sea or on the banks of a running stream. The test of its gradual nature is that the witnesses shall have been unable to perceive the additions to the soil while they were being made, though from time to time they may observe that such increase has taken place. It makes no difference whether the increase is due to natural or artificial causes. It belongs to the owner of the land at the water's edge where the accretion is going on. In this respect it is distinguished from avulsion or the sudden tearing away of land and the transferring of it from the estate of one person to that of another, in which case in the United States and in Scotland the transferred soil belongs to the former owner. According to the law of England, however, in case of a sudden and considerable acquisition on the shore, the ground acquired shall belong to the crown. Where, however, the crown may have made a grant to a subject *cum litore maris*,—that is, the space between the high and the low water-mark,—it would seem that a sudden or considerable increase of land by alluvion within these limits must belong to the grantee. In Scotland the shore is not considered to be the property of the sovereign, but it is presumed to be granted as a part and pertinent of the adjacent land under the burden of the crown's right as trustee for the public uses, of which navigation and fishing are the chief.

ALLUVIUM, a term originally applied to those deposits which were supposed to have been formed subsequently to the flood, while diluvium (q.v.), included its products. In modern geological classification, these two terms, in this sense, have been abolished, as their connection with the deluge is denied. The diluvial and alluvial deposits are included under the pleistocene formation (q.v.). The name is now given to those depos-

its of mud, soil, sand, gravel, etc., which are brought down by streams and rivers and spread over lower lands. See DELTA; DENUDATION.

ALLYGURH, a fort in the district of the same name in India. Lat. $27^{\circ} 56'$ n., long. $78^{\circ} 8'$ e. It lies on the route between Agra and Delhi, being 55 m. from the former, and 74 from the latter. Partly to this commanding situation, and partly to the strength derived from its surrounding marshes, it owes any importance that it possesses. It was stormed by the British in 1803, being then the principal depot of the French party in the Doab—an exploit of sufficient consequence to be commemorated by a medal in 1851. But within 6 years after 1851, A. became the arena of a still more desperate struggle. Ten days after the outbreak at Meerut, the native troops in garrison mutinied. Fortunately, the Europeans escaped with comparatively little sacrifice of life. But the temporary loss of the place almost cut off the communications between the s.e. and the n.w.—The district of A. (or *Aligarh*), in the n.w. provinces, has an area of 1952 sq.m.; pop. '91, 1,043,000.

ALLYL (Lat. *allium*, garlic) is an organic radical, represented when in combination by C_3H_5 , and when in the free state by C_3H_{10} . The first compound discovered was iodide of allyl, which was obtained by Berthelot and De Luca in 1854; two years later, they isolated allyl; and shortly afterwards, Wertheim demonstrated its existence in the oils of mustard and garlic. Its properties, and those of some of its most important compounds, are described in the article GARLIC, OIL OF.

ALMA, a river in the Crimea, rising at the foot of the Tchadir Dag, and flowing westward into the bay of Kalamita, about half-way between Eupatoria and Sebastopol. On the steep banks of this stream, through the channel of which the British troops waded amidst a shower of bullets, a brilliant victory was won on the 20th of Sept., 1854, by the armies of Britain, France, and Turkey, under lord Raglan and Marshal St. Arnaud, over the Russian army commanded by Prince Menschikoff.

AL MACK'S. A suite of assembly rooms in King street, London. They were built in 1765 by Almack, a tavern-keeper, and were hence called Almack's Rooms;* they are now generally called Willis's Rooms, from the name of the present proprietor. The name of A. is chiefly associated with the balls that have, since the opening of the rooms, been held there under the management of a committee of ladies of high rank; and has become synonymous with aristocratic exclusiveness.

ALMADA, a t. of Portugal, in the province of Estremadura, on the s. bank of the Tagus, opposite to Lisbon, and distant from it less than 2 m. There is frequent steam communication with Lisbon. A. is built upon a height, from the summit of which, above the t., there is a magnificent view of Lisbon and the Tagus. A. has a strong castle on a rock. The surrounding country is well cultivated. A. has long been celebrated for its figs. Near it is the gold mine of Adissa. Pop. 10,000.

ALMADEN, or ALMADEN DEL AZOGUE (Arabic, "the mine of quicksilver"), a t. in Spain, 50 m. s.w. of Ciudad Real, is the *cisapona cetobrix* of the Romans, and is situated between two mountains in the chain of the Sierra Morena. Pop. 8200. It is famous for its exceedingly rich quicksilver mines. These mines were worked by the ancient Iberians; afterwards by the Romans. They were rented by the Fuggers of Augsburg in the 16th c., but were taken under the care of the Spanish government in 1645. Some years since (1843), the Rothschilds undertook the working of these mines. There is a school of mines in the place.

AL'MADEN, a t. in Santa Clara co., Cal.; pop. '90, 1932. It is noted for the New Almaden quicksilver mines near by. The deposit was found at an early period by the Indians, who used the crude cinnabar for paint. It was first worked for mercury in 1851. The product of the mines has greatly declined since 1887, when it reached 20,000 flasks. In 1892 the output was only 5563 flasks. This placed New Almaden third in production among American mines, although previously, ever since 1851, it had easily held first place.

AL'MAGEST, the name given by the Arabs to the great work of Ptolemy the astronomer (q. v.).

ALMA GRO, a t. of New Castile, Spain, in the province of Ciudad Real, and 12 m. e.s.e. from Ciudad Real. It is situated in a high arid plain, but is very well built, with wide paved streets, a fine square, and a public walk lined with trees. Its most noteworthy building is an old church of beautiful architecture. It is a place of greater activity than most Spanish towns, and its whole appearance indicates prosperity. Brandy, soap, and earthenware are manufactured, and lacemaking gives employment to large numbers of women in A. and the neighboring villages. The surrounding country is celebrated for its mules. There are two great annual fairs, at which mules and lace are sold. Pop. about 8500.

ALMA GRO, DIEGO D', a Spanish *conquistador*—i.e., adventurer—in the conquest of S. America, was b. in 1475. He was a foundling, and derived his name from the town in the

* Almack, it is said, was originally a poor Scottish Highlander, named McCall. As a preparatory step to rising into importance in London, he inverted the syllables of his name.

vicinity of which he was found. Along with many other adventurers, he went, as was common in those days, to seek his fortune in the new world which Columbus had opened up. There he amassed considerable wealth by plunder, and became one of the most influential persons in the new colony of Darien, when he was persuaded to join Pizarro in his attack on Peru. The undertaking was crowned with astonishing success. He was now appointed, in the absence of Pizarro, who had returned to Spain with rich presents, governor of the conquered country, and received permission of the Spanish court to conquer for himself a special province s. of the territory subdued by Pizarro. In 1534, therefore, he marched on Chili, penetrated deeply into the land, and returned in 1536, just when the Peruvians had flown to arms under their young inca, Mungo Capac, and shut up the Spaniards in Cuzco and Lima. As these towns lay s. of Pizarro's district, they were claimed by A. He dispersed the Peruvian army before Cuzco, and advanced with his forces against Lima, hoping to make himself sole master of the country. But the crafty Pizarro contrived, by means of a truce, to gain time for collecting his forces. On the 6th of April, 1538, a desperate engagement took place near Cuzco, in which A. was defeated and taken prisoner. He was condemned to death; and on the 26th of the same month, he was strangled in prison, and his corpse beheaded in the market-place of Cuzco. His son, Diego d'A., gathering together several hundreds of his father's followers, stormed the palace of Pizarro, whom he assassinated (1541); he then proclaimed himself capt.-gen. of Peru; but the friends of the murdered governor resisting his claims, Baca de Castro was sent out from Spain, as supreme arbiter, to quell all disturbances. Diego was now requested to submit; and on his refusing, was attacked by the troops of Baca, when the bloodiest battle took place that had ever been known in America (1542). Diego, having been defeated and taken prisoner, was executed along with 40 of his companions.

ALMALEE', or **ALMALI**, a large t. of Asiatic Turkey, in the vilayet of Konia. It is situated on the river Myra, about 25 m. from the sea, and is much frequented by European merchants from Smyrna, etc., who purchase the various products of the place. A. has numerous mills propelled by water, tan-yards, dye-works, and factories. The inhabitants are very industrious, and everywhere may be seen indications of their prosperity—in the clean and comfortable houses, neat apparel, excellent roads, fences, bridges, etc. A. is built in a picturesque valley at the edge of a large plateau, 5000 ft. above the sea, and is embosomed in gardens, which, together with the minarets and lofty pillars interspersed through the town, give it a striking appearance. Pop. estimated at from 4000 to 25,000.

AL'MA MA'TER (Lat., nourishing mother) is a name given to a university in relation to those who have studied at it, to distinguish it from inferior schools of learning. The word *alma* (nourishing, sustaining, or kind) was applied by the Latin authors to such of the deities as were friendly to men—Ceres, Venus, etc., and also to the earth, the light, the day, wine, and the soil.

AL-MAMÛN', or **AL-MAMOUN**, ABÛL-ABBAS-ABDALLAH, b. 786, a renowned caliph of the Abbasides, son of Haroun al-Raschid. When Haroun died, Mamun was governor of Khorassan, and his brother Amin took the Bagdad caliphate; but his treatment of Mamun led to war, and after five years of fighting Amin was slain and Mamun took his place, Oct. 4, 813. The early part of his reign was disturbed by revolts and heresies; but when affairs settled down he fostered the cultivation of literature and science in all his empire, and Bagdad became the seat of academical instruction and the center of intelligence. He had books translated from old and living languages, founded astronomical observatories, determined the inclination of the ecliptic, had a degree of the meridian measured on the plain of Shinar, and constructed astronomical tables of remarkable accuracy. He paid more respect to science than to orthodoxy, and drew his men from all countries and all creeds. This liberalism resulted in the caliph's conversion in 827 to the heterodoxy of the Motasali, who asserted the free will of man and denied the eternity of the Koran. In the latter years of his reign he was in hostilities with the Greek emperor Theophilus; revolts broke out in various parts of his empire; Spain and n.w. Africa asserted their independence, and Egypt and Syria were inclined to follow. In 833, after quelling a disturbance in Egypt, he marched into Cilicia against the Greeks, but died suddenly near Tarsus, leaving his crown to Motassem, a younger brother. Mamun was the author of *Inquiries into the Koran*, a tract on *Signs of Prophecy*, and one on *The Rhetoric of the Priests and Panegyrists of the Caliphs*.

ALMANAC, from the Arabic article *al*, and *manah*, to count, a word received by the European nations from the east, denoting a book or table containing a calendar of the civil divisions of the year, the times of the various astronomical phenomena, and other useful or entertaining information. Till a comparatively modern date, this additional matter consisted of astrological predictions and other analogous absurdities; it now embraces, in the best almanacs, a wide variety of useful notes and information, chronological, statistical, political, agricultural, etc.—The Alexandrian Greeks had almanacs. The time at which they first appeared in Europe is not precisely known. The oldest of the copies (manuscript) existing are of the 13th–14th c.; there are specimens in the libraries of the British museum and of Corpus Christi college, Cambridge. The earliest known printed European A. was compiled by the celebrated astronomer Purbach, and

appeared between the years 1450, 1461; but the first A. of importance was that composed by his pupil, Regiomontanus, for the fifty-seven years from 1475 to 1531, for which he received a munificent donation from Matthias Corvinus, king of Hungary. Bernard de Granolachs of Barcelona commenced the publication of an A. in 1487; the printer Engel of Vienna, in 1491; and Stöffler of Tübingen, in 1524. Copies of these are now very rare. In 1533, Rabelais published, at Lyon, his A. for that year, and renewed the publication in 1535, 1548, and 1550. The fame and popularity of the celebrated astrologer, Nostradamus, who prophesied minutely the death of Henry II. of France, the execution of Charles I. of England, the great fire of London, the restoration, etc., gave such an impulse to the publication of predictions, that in 1579, Henry III. of France prohibited the insertion of any political prophecies in almanacs—a prohibition renewed by Louis XIII. in 1628. Before this, in the reign of Charles IX., a royal *ordonnance* required every A. to be stamped with the approval of the diocesan bishop.

Prophetic almanacs still circulate to an incredible extent in France in the rural districts, and among the uneducated. The most popular of all these is the *Almanach Liégeois*, a venerable remnant of superstition. It was first published at Liege—according to the invariable title-page which takes no note of time—in 1636, by one Matthieu Laensbergh, whose existence, however, at any time seems very problematical. The *Almanach Liégeois* is a most convenient one for those who are unable to read, for by certain symbols attached to certain dates, the most unlettered persons can follow its instructions: thus the rude representation of a vial announces the proper phase of the moon under which a draught of medicine should be taken; a pill-box designates the planet most propitious for pills; a pair of scissors points out the proper period for cutting hair, a lancet for letting blood. Of course, amidst innumerable predictions, some may naturally be expected to come to pass. So in 1774, this A. predicted that in the April of that year a royal favorite would play her last part. Madame Dubarry took the prediction to herself, and repeatedly exclaimed: "I wish this villainous month of April were over." In May, Louis XV. died, and Madame Dubarry's last part was really played. The credit of old Matthieu was established more firmly than ever. In 1852, a number of commissioners, appointed by M. Maupas, minister of police, having examined between 7000 and 8000 of the national chapbooks, which included a great number of almanacs, pronounced them so deleterious, that it became necessary forcibly to check their circulation. Although still in vogue amongst the ignorant peasantry, it is gratifying to learn that their popularity is greatly on the wane, and that various periodicals on a better plan have started up in France of late years.

In England, so far was any restraint from being put upon the publication of prophetic almanacs, or "prognostications," as they were usually called, that the royal letters-patent gave a monopoly of the trade to the two universities and the stationers' company, under whose patronage, and with the *imprimatur* of the archbishop of Canterbury, such productions as *Moore's A.* and *Poor Robin's A.* flourished vigorously; although "it would be difficult to find, in so small a compass, an equal quantity of ignorance, profligacy, and imposture, as was condensed in these publications." The memory of Partridge, long employed as the prophet of the stationers' company, is preserved in the lively diatribe of Swift, writing under the name of Bickerstaff. In 1775, a decision of the court of common pleas, in favor of a bookseller named Carnan, abolished the monopoly of the stationers' company. In 1779, lord North brought in a bill renewing their privileges. After a powerful speech against the measure by Erskine, who exposed the pernicious influence of the productions published under the monopoly, it was rejected. The stationers' company, however, still maintained their ground by buying up all rival almanacs; and it was not until the publication, in 1828, of the *British A.* by the society for the diffusion of useful knowledge, that the eyes of the English public became opened to the irrational and deleterious nature of the commodity which their own indifference or folly, as much as the selfishness of their purveyors, had hitherto maintained in existence. The success of this admirable publication—which still continues to appear annually—stimulated the stationers' company to improvement, and they accordingly published the *Englishman's A.* The *British A.* is itself now published by the stationers' company. Whitaker's A. is a valuable compendium.

In Scotland the earliest almanacs seem to have been produced about the beginning of the 16th c. Shortly after the beginning of the 17th c. the almanacs or "prognostications" published at Aberdeen had begun to establish that celebrity which is hardly yet extinct. About the year 1677 they were sold for a *plack* each; and the annual circulation amounted, on an average, to 50,000 copies. In 1683, appeared a rival publication, under the title of *Edinburgh's True Almanack, or a New Prognostication*. For a long time Scottish almanacs continued, like all others of that age, to contain little besides a calendar, with a list of fairs, and—what constituted the great attraction—predictions of the weather. But something more instructive and comprehensive became requisite, and the *Edinburgh A.* seems to have been among the first to respond to this requirement of advancing civilization; for, by various editions, such as a list of Scottish members of parliament, it had, in 1745, been extended from the original 16 pages to 36. In 12 years from that date it had swelled to 72 pages; in 1779 it had reached 252 pages. Since 1837, it has been published under the title of *Oliver and Boyd's New Edinburgh A.*, and now extends to above 1000 pages. It contains an amount of information on all public

matters, especially those connected with north Britain, which, in its completeness, leaves little to be desired.

What *Oliver and Boyd's Edinburgh A.* is to Scotland, is *Thom's Irish A.* to Ireland—a work not less excellent, and even more extensive.

Almanacs containing astrological and other predictions are still published in Great Britain, but their influence is extremely limited, even among the most ignorant portion of the community, and their contents are fitted to excite amusement rather than any stronger emotion.

Of important national almanacs are the French *Almanach Impérial*, begun in 1679, a bulky octavo volume, full of useful information; the Belgian *Royal A.*, very similar in character; the Prussian *Royal A.*; and the American *A.*, a very meritorious publication. The *Almanach de Gotha*, begun in 1763, has a European, or rather a cosmopolitan, character. See GOTHÄ, A. DE.

The most important astronomical A. published in Britain is the *Nautical A.*, projected by the astronomer-royal, Dr. Maskelyne, and first published, with the authority of government, in 1767. After his death it gradually lost its character, and in 1830, in consequence of the numerous complaints made against it, the government requested the astronomical society to pronounce upon the subject. The suggestions of the society were adopted, and, in 1834, the first number of the new series appeared, with such additions and improvements as the advanced state of astronomical science rendered necessary. Still older than this A. is the French *Connaissance des Temps*, commenced in 1679 by Picard, and now published under the authority of the *Bureau des Longitudes*. Its plan is similar to that of the *Nautical A.*, but it contains a larger amount of original memoirs, many of them of great value. Equally celebrated is the Berlin *Ephemeris*, published so long under the superintendence of the late prof. Encke, being an improvement on the *Astronomisches Jahrbuch*, conducted by his predecessor Bode.

Another kind of A., which has especially flourished in Germany and France, belongs rather to the class of publications known in Britain as *Annals*. Such have been the *Almanach des Muses, des Dames, Populaire, Icarien, Napoléonien*, etc., the latter of which were specially devoted to the interests of particular parties, political or religious. Of this kind, the examples in Britain are innumerable, and, in fact, the publication of an A. has now become a favorite medium of advertising and puffery.

In this country *The American Nautical Almanac* was begun in 1849 by Charles Henry Davis, U. S. navy, and the first volume (for 1855) was published in 1853. It is believed that the first common A. in this country was for 1687, from Bradford's press in Philadelphia. Franklin's *Poor Richard's Almanac*, begun in 1732, was kept up by him about 25 years, and was widely known in this country and abroad for its wise and witty sayings. The *American Almanac, and Repository of Useful Knowledge*, was issued in Boston from 1828-'61; a continuation, *The National Almanac*, came out for two years only, 1863-64. In 1878, A. R. Spofford, librarian of congress, began an *American Almanac and Treasury of Facts, Statistical, Financial, and Political*, a comprehensive and valuable work. Political almanacs were headed by *The Whig*, now *The Tribune Almanac*, regularly issued from 1841, and still continued. *The New York Herald, Philadelphia Ledger*, and other great journals issue almanacs. Nearly every religious denomination has its special annual, either A. or year-book; and many trades, professions, and enterprises have similar publications. Not the least noticeable are the almanacs of the patent-medicine dealers, in English, German, French, Spanish, and other languages, which are given away by millions.

ALMANAC is also the term applied by antiquaries to calendars found carved, usually on staves, but also on tablets of wood, scabbards of swords, handles of hatchets, etc. The inscribed characters are sometimes the Runic—hence the name of *runestaffs, Scipiones Runic*—and sometimes the Gothic. The saints' days are denoted by symbols, as a pair of shoes for St. Crispin's day. These primitive almanacs were in use among the Scandinavian nations, and the examples of them found in Britain are thought to have been introduced by the Norsemen.

ALMANACH DE GOTHÄ. See GOTHÄ, ALMANACH DE.

AL'MANDINE (Fr., *almandine*, from Lat., *alabandina*, so called from Alabanda, a town in Caria, where it was first found), the red transparent variety of garnet (q.v.).

ALMANSA, a t. of Murcia, Spain, in the province of Albacete, and 43 m. e. by g. from Albacete, on the Madrid and Alicante railway. It is situated in a wide plain, and is tolerably well built, and rather flourishing. The *vega*, or plain around the t. is irrigated by water from a large reservoir called the *Pantano of Albufera*, and is very fertile. Many of its ague-breeding swamps have been drained and brought under cultivation. A. carries on manufactures of linen, hempen, and cotton fabrics, the materials of which are supplied from the neighborhood, also of brandy, leather, and soap. Pop. 9700.—Near A. the French, under the duke of Berwick, natural son of James II. of England, gained a victory, on 25th April, 1707, over an army of Spanish and English troops, commanded by Henry de Ruvinny, earl of Galway. The French were more than twice the number of their opponents. Ruvinny fought under orders

from home, contrary to his own judgment, and was deserted by the Spaniards almost as soon as the battle began. The battle of A. was, in its results, one of the most important in the war of the Spanish succession. See SUCCESSION WARS.

ALMANSOR, or, with his full name, Abu-Jafer-Abdallah-ben-Mohammed-al-Mansor (al-mansor, "helped by God"), the second caliph of the house of the Abbasides (q. v.), reigned from 754 to 775. Warfare, treachery, and murder were his steps to the throne, and his whole rule was as cruel as its beginning. He specially persecuted the Christians in Syria and Egypt. In war against external foes he had but little success. He removed the seat of the caliphate from Kufa to Bagdad, which he built at immense cost, raising the money by oppressive taxation. He introduced the pernicious custom of making his freed slaves, mostly foreigners, rulers of provinces. The best feature in his character was his patronage of learning. He caused the *Elements* of Euclid to be translated from the Syriac, and the famous fables of Bidpai (q. v.) from the Persian language. A. d. during a pilgrimage to Mecca, in the 63d year of his age.

ALMA-TADEMA, LAURENCE, painter, b. at Drouryp, Netherlands, in 1836; became a student at the Antwerp Academy in 1852, and subsequently studied with the late Baron Henry Leys; settled in London in 1870, and was naturalized in 1873. He made a special study of Egyptian, Greek, and Roman life; was appointed an officer of the Legion of Honor in 1878, elected a royal academician in 1879, and appointed a foreign Knight of the German order *Pour le Mérite* by the emperor in 1881. Among his works, which are very numerous, are *The Vintage*, *Catullus*, *An Audience at Agrippa's*, *The Seasons*, *Sappho*, *The Way to the Temple*, *Comparisons*, and *At the Close of a Joyful Day*, the two last-named being in 1893 and 1894 respectively. His wife (LAURA EPPS) was a noted painter before her marriage, and afterward a frequent exhibitor in the galleries.

ALMEH, or **ALMAI**, a class of singing girls in Egypt. To enter the A. one must have a good voice, understand the language well, know the rules of verse, and be able to improvise couplets adapted to circumstances. They are in demand at all entertainments and festivals, and at funerals as hired mourners. They are distinct from the ghawazee, or dancing girls, who are of a lower order, and perform in the streets.

ALMEIDA, one of the strongest fortified places in Portugal, is situated on the river Coa, on the Spanish frontier, in the province of Beira. Pop. about 2000. In 1762 it was captured by the Spaniards, who soon afterwards surrendered it. Here, in 1810, when the French, under Marshal Ney, attempted to cross the Coa into Portugal, the English colonel, Cox, defended the town against Marshal Massena; but the explosion of a powder-magazine compelled him to capitulate. In their retreat from Portugal, 1811, the French, under Gen. Brenier, destroyed a great portion of the fortifications of A.; which, however, were speedily repaired by the English.

ALMEIDA, DON FRANCESCO D', a famous Portuguese warrior, who flourished in the latter part of the 15th and the beginning of the 16th c. He was the seventh son of the count of Abrantes, and at an early period distinguished himself in the wars with the Moors, but especially at the conquest of Granada, in 1492. In 1505, his sovereign, Emanuel I., in consideration of his great abilities, appointed him viceroy of the Portuguese possessions in the East Indies. On the 25th of March he set sail from Lisbon with a fleet of 36 vessels, containing 1500 men, many of whom were noblemen, and all of good family. On the 22d of July he reached Quiloa, on the Mozambique coast, where he was soon involved in a quarrel with the king of that city, the result of which was that A. deprived him of his crown, built a fortress to overawe the inhabitants, and proceeding to Zanzibar, destroyed the t. of Mombaza. He then sailed for the Indies, asserting everywhere the superiority of the Portuguese flag. At Cananor, Cochin, Coulan, Ceylon, and Sumatra, he either built fortresses to protect the factories and commercial interests of his nation, or established new factories. With the king of Malacca a commercial treaty was formed about the same time. His son, Lorenzo, carried on several expeditions as his father's lieutenant, visited Ceylon, and discovered the Maldive islands and Madagascar. The chief design of A. was to make the Portuguese sole masters of the Indian seas, and by blockading the Persian and Arabian gulfs, to exclude the Egyptians and Venetians from commerce with the east. To frustrate his endeavors, the Egyptian sultan fitted out, by the help of the Venetians, a large fleet, which, under command of the Persian, Mir-Hakim (or Hossein, according to others), was sent to the assistance of the king of Calicut. In the port of Chaul, young Lorenzo was attacked in very disadvantageous circumstances by Mir-Hakim. He fought with astonishing bravery; his ships had all but made their escape out to the open sea, when his own was separated from the others and struck upon a rock; one chance shot carried off one of his legs, and another, tearing away a part of his side, killed him. His father speedily took measures to revenge the death of his son upon the hated Mussulmans, when Alfonso d'Albuquerque appeared on the scene (1507), having been sent out by the Portuguese government to supersede A., whom it had begun to distrust on account of his brilliant successes. The latter refused to recognize Albuquerque as viceroy, and for some months kept him prisoner at Cochin. He now sailed along the coasts, burning and plundering various sea-ports, amongst others Goa, and at length utterly destroyed the Egyptian fleet at Diu. From this fierce and avenging expedition he returned to Cochin, resigned his office into the hands of his successor, and set out on his homeward voyage, Nov. 13, 1508. But he was not destined to see his native land again, for he was slain March 1, 1510, in an affray with the savages at

cape Saldanha, in the s. of Africa, where his men had landed. He was a man of stern, vigorous, and yet impulsive character, capable of severe retaliation of injuries, but not destitute of clemency and generosity.

ALMERIA (Arab. Al-Meryah, "the conspicuous"), anciently Murgis, or *Portus Magnus*, the chief t. in the Spanish province of the same name, at the mouth of the river Almeria. It has a well-defended harbor, a cathedral, besides 26 churches and monasteries, and a grammar school. In the time of the Moors it was, next to Granada, the richest and most important t. in the kingdom, and flourished alike in arts, industry, and commerce, being the "great port" of traffic with Italy and the east. At one time, it was as terrible a nest of pirates as Algiers itself, under the Moorish chief Ibn Mayman, when even Granada, according to the proverb, was merely its "farm." Now it has only a few trifling manufactures, although it still keeps up considerable trade in cochineal, red silk, lead, grapes, and especially wine. The cotton tree has been planted in the environs of A. by English merchants. Pop., (1887) 36,200

ALMODOVAR DEL CAMPO, a t. of New Castile, Spain, in the province of Ciudad Real, 22 m. s.w. from Ciudad Real. It stands on the summit of a ridge, near the Vega, a branch of the Guadiana. The streets are tolerably clean, but ill paved. There are ruins of an ancient castle. The inhabitants are chiefly employed in agriculture, and the only manufactures are domestic. Pop. about 8000.

AL/MOHADES, the name of a dynasty that ruled in Africa and Spain during the 12th and 13th c. The word is Arabic, and signifies Unitarians. It was taken as a term of distinction; for the A. considered themselves the only Mohammedans who worshiped God properly. The founder of this sect, which at first was religious rather than political, was called Mohammed Ibn-Youmert, a native of the Atlas region. He was a man of a bold and subtle intellect, and extremely ambitious. He had traveled much, and acquired a manifold knowledge and experience. His first measures were extremely prudent. He commenced preaching with great zeal the reformation of all abuses, affecting himself an austere and unselfish life. He went about covered with rags, prohibiting wine, music, and all pleasures. At first his denunciations were generally held in contempt; but at length his partisans became so numerous, that Ali, king of Morocco, was compelled to take measures against him. It was, however, too late. The Arabs and Berbers flocked to his standard; and at the end of a few years he was master of the provinces of Fez, Morocco, Tlemzen, Oran, and Tunis. Mohammed imposed on his disciples new ceremonies, and composed for their benefit a special treatise entitled *On the Unity of God*. The A. extended their conquests into Spain, subjugating Andalusia, Granada, Valencia, and a part of Aragon, and Portugal as far as the Ebro and Tagus. Mohammed was succeeded in his authority by Abdelmoumen, who had formerly been his lieutenant. Under him and his descendants, Jussuf and Jacob, the dynasty of the A. continued to flourish in great splendor. But in 1212 they were completely defeated by the Spaniards in the famous battle of Tolosa, the result of which was a general revolt of the Christian provinces under their sway. The power of the A. was destroyed in Spain in 1257, and in Africa in 1269.

AL'-MOKANNA, or MOKENNA. See MOHAMMEDAN SECTS.

AL/MOND, *Amygdalus*, a genus of the natural order *rosaceæ* (q.v.), sub-order *amygdaleæ* or *Drupaceæ*, consisting of trees or shrubs, distinguished by the coarsely furrowed and wrinkled shell (*endocarp* or *putamen*) of the drupe, and by the young leaves being conduplicate, or having their sides folded together. According to the greater number of botanists, it includes the PEACH (q.v.), constituted by some into a distinct genus, *persica*, in which the drupe has a fleshy covering (*sarcocarp*), whereas in the species to which the name A. is commonly given, this part is a dry fibrous husk, which shrivels as the fruit ripens, and finally opens of its own accord. The A.-tree (*amygdalus communis*) is very similar to the peach-tree, and is distinguished from it principally, besides the difference of the fruit, by the fine glandulous serratures of the leaves, the stalk of which equals, or even exceeds, in length the breadth of the blade. It is a tree about 20 to 30 ft. high, a native of the east and of Africa, but has now become completely wild in the whole s. of Europe. Even in the more northern parts of Germany and of Britain it is planted for the sake of its beautiful flowers, which are produced in great abundance, and resemble those of the peach in form and often in color, although generally paler and sometimes white. The blossoms appear before the leaves, and are very ornamental in shrubberies in March and April; and even when frosts destroy the germ of the fruit, the brilliancy of the flower is not impaired. The wood of the A.-tree is hard, and of a reddish color, and is used by cabinet-makers, etc. But it is chiefly valued on account of the kernel of its fruit, well known by the name of ALMONDS, and forming an important article of commerce, for the sake of which it is extensively cultivated in the s. of Europe and other countries of similar climate. It is mentioned in the Old Testament, and appears to have been cultivated from a very early period. It was introduced into Britain as a fruit-tree before the middle of the 16th c.; but it is only in the most favored situations in the s. of England that it ever produces good fruit.—Almonds are either sweet or bitter. The bitter appear to be the original kind, and the sweet to be an accidental variety, perpetuated and improved by cultivation. SWEET ALMONDS

contain a large quantity of a very bland, fixed oil, emulsion, gum, and mucilage sugar, are of a very agreeable taste, and very nutritious, and are used in the dessert, in confectionery, and medicinally in an emulsion, which forms a pleasant, cooling, diluent drink. BITTER ALMONDS contain the same substances, and, in addition, a substance called *amygdalin*, from which is obtained a peculiar volatile oil. (For the oils derived from almonds, see the following articles).—The muddy water of the Nile is clarified by rubbing bitter almonds on the sides of the water-vessels, in the same way in which the nuts of the *strychnos potatorum* (see CLEARING NUT) are used in India. The principal varieties of A. in cultivation are: the common *sweet A.*, with thick hard shell; the *brittle-shelled*, with a very thin, almost leathery, brittle shell, and sweet kernels; the *bitter A.*, with thick hard shell (sometimes also with a brittle shell), and bitter kernels; the *large-fruited*, with large flowers of a whitish rose-color, and very large sweet fruit; the *small-fruited*, with very small sweet fruit; and the *peach A.*, with a slightly succulent blackish *sarcocarp* (see above), yellow shell, and sweet kernels. The *sarcocarp* is, in the different varieties, more or less dry, or somewhat fleshy and juicy, so that some authors have disputed even the specific distinction between the A. and the peach. In commerce the long almonds of Malaga, known as Jordan almonds, and the broad almonds of Valencia, are most valued. Large quantities of almonds are annually imported into Britain and America from France, Spain, Italy, and the Levant. Bitter almonds are brought to Britain chiefly from Mogadore.—The DWARF A. (*A. nana*) is very similar to the common A., except that it is a low shrub, seldom more than 2 or 3 ft. in height. Its fruit is also similar, but much smaller. It is common in the plains of the s. of Russia, and is frequently planted as an ornamental shrub in Britain, flowering freely in March and April, but not producing fruit. It is very beautiful when covered with its pink flowers in spring, and deserves to be more frequently planted than it is. A sheltered but sunny situation is favorable to it.—Other species, little known, but very similar to these, are found in the east, and one on arid hills in Mexico.

ALMONDBURY, s.e. of Huddersfield, is practically a part of that place. There is a free grammar school, founded in 1609. A. is of great antiquity, and is supposed to have been the residence of some of the Saxon kings.

ALMONDE, PHILIPPUS VAN, 1646-1711; a Dutch vice-admiral, serving under De Ruyter in the fights of 1666, and after the admiral's death commanding the Dutch Mediterranean fleet, gaining fame in the defeat of the French at La Hague in 1692. He was with Van Tromp in subduing the naval power of Sweden.

ALMONDS, FIXED OIL OF. When almonds are subjected to pressure, a fixed greasy oil exudes. Either bitter or sweet almonds may be employed; but the former are generally used, as they are cheaper than the sweet almonds, and the expressed cake is valuable in the preparation of the *essential oil*. One cwt. of the almonds generally yields 48 to 52 lbs. of the fixed oil. When first obtained it possesses a turbid or milky appearance; but when allowed to stand at rest, the impurities settle, and a clear, light, yellow oil remains above. It has the specific gravity of .920, and solidifies when cooled to between + 14° and - 5° F. (- 10° and - 20° C.). It has no odor, and when fresh has a mild, nutty taste, but soon becomes rancid by exposure to the air; it is not, however, one of the drying oils. It consists almost wholly of *trioléin*, a compound of glycerine with oleic acid. The fixed oil of A. is used in medicine, and possesses a mild laxative property when administered in large doses. It is beneficial, also, in allaying troublesome coughs.

ALMONDS, VOLATILE OIL OF, OR ESSENTIAL OIL OF. The cake which is left after the expression of the fixed oil from bitter A., contains, among other matters, a portion of two substances, called, respectively, amygdalin, and emulsin or synaptase. When the cake is bruised and made into a paste with water, the synaptase acts as a ferment upon the amygdalin, splitting it up into the volatile oil of A., hydrocyanic (prussic) acid, grape-sugar, ammonia, formic acid, and water. The oil is not originally present in the bitter A.; in fact, the latter do not contain a trace of the oil ready formed, so that the oil is purely the product of the fermentation of amygdalin, 100 parts of which yield 47 of crude oil. This action takes place very rapidly, and is complete in 24 hours. The paste having been placed in a retort, heat is very cautiously applied, to prevent the lumping and frothing to which the almond infusion is liable. In the distillation, the hydrocyanic acid and the volatile oil unite in an unstable compound which passes over into the receiver, along with much water. The crude oil thus obtained decomposes gradually, the prussic acid being set free, and on this account it is very poisonous, many fatal cases having occurred from its willful, accidental, or careless use. The crude oil is purified and freed from prussic acid by means of sulphate of iron and lime. On redistillation it has a specific gravity of 1.049, as compared with 1.064 in the crude state, and must be carefully freed from water by being shaken with fused chloride of calcium. The yield of crude essential oil is very variable, ranging from 4 to 9½ lb. from 1000 lb. of bitter almonds, and this again is reduced by about 10 per cent. during its purification from prussic acid. The volatile oil (C₆H₅COH) is the aldehyde of benzoic acid (C₆H₅COOH), into which substance it rapidly changes when exposed to the air in a moist state. It has an agreeable odor, an acrid, bitter taste, and burns with a smoky white flame. It is soluble to the extent of 1 part in 30 parts of water, and is very soluble in alcohol and ether. Heated to 356° F. (180° C.), it boils, and distills over unaltered. In medicine

the volatile oil is used in place of prussic acid, but is very variable in strength, being sometimes four times the strength of medicinal prussic acid. The dose is a quarter of a drop to a drop and a half in an emulsion. The cook and confectioner employ the oil for flavoring custards, etc., and the perfumer uses it for scenting toilet-soap, etc.

ALMONER is the name given originally to that member of a religious order who had the distribution of the money and other things set apart for alms, which, by canonical law, was to amount to at least a tenth of the revenues of the establishment. Afterwards those ecclesiastics also received this name who were appointed by princes to the same office in their households. The grand A. of France was one of the principal officers of the court and of the kingdom, usually a cardinal, and, in right of his office, commander of all the orders, and also chief director of the great hospital for the blind. Queens, princes, and princesses had also their almoners, and bishops were usually appointed to this office. In England, the office of *hereditary grand almoner* is now a sinecure, his only duty being to distribute the coronation medals among the assembled spectators. The *lord high almoner*, who is usually a bishop, distributes twice a year the queen's bounty, which consists in giving a silver penny each to as many poor persons as the queen is years of age.

ALMONTE, DON JUAN NEPOMUCINO, 1804-69; a Mexican general and diplomat, of Indian blood in part, and reputed son of Morales. He filled diplomatic positions in the United States, England, Peru, and France. He was captured while on Santa Anna's staff at the battle of San Jacinto in 1836, but was released six months later. He became Mexican minister of war, and during the war with the United States he fought under Santa Anna. At Paris he was active in promoting the French invasion of Mexico and the election of Maximilian. A. was appointed dictator of Mexico in 1862, but was distrusted by all parties, and was removed the same year. The next year he was president of a junta styled the "regency of the Mexican empire." In 1864 he was made regent and grand marshal, and in 1866 he was sent as minister to Paris, where he died.

ALMORA, the principal t. of the British district of Kumaon (q.v.), India, 87 m. n. from Bareilly, on the crest of a mountain ridge, 5337 ft. above the sea, on the headwaters of the Kosila, a branch of the Ramgunga. It consists chiefly of one street, three quarters of a mile long. The houses have a ground story of stone; the upper stories are of wood, covered with a sloping roof of heavy gray slate, on which small stacks of hay are sometimes erected. The ground story is generally white-washed and tricked out with grotesque paintings. Detached houses, both of Europeans and Brahmans, are scattered along the face of the mountain below the t. A. is a British military station, the lines of the regular troops and fort Moira being close to the t. Since it came under British sway it has been rapidly increasing in prosperity. Pop. 8000.

ALMORAVIDES ("the *Moravides*"), or MORA-BETHUN, the name of an Arab dynasty that ruled in Africa and Spain in the 11th and 12th c. of the Christian era. The name A., which is commonly given to this dynasty by western writers, is a corruption of the Arabic word *Al-morabeth*, "the champion of religion." This sect took its rise about 1050 among the Arab and Berber tribes which dwelt on the slopes of the Atlas range facing the Atlantic, and was founded by a Moslem teacher called Abdalla-ben-Yasim, who undertook to rescue these tribes from the gross ignorance in which they were plunged, and instructed them in the doctrines of the Mohammedan faith. The new proselytes soon exhibited the fruits of this teaching by descending from their hills, under the leadership of a chief named Abu-bekr, and conquering the kingdom of Fez. The adjoining kingdom of Morocco shared the same fate; and the victorious enthusiasts, under the famous Yussuf-ben-Taxfin, the cousin of Abu-bekr, next crossed the strait of Gibraltar, and subdued Spain to the Tagus on one side, and to the Ebro on the other. But this extensive and powerful dominion was of too rapid growth to possess much stability; and during the reign of Ali, the son of Yussuf, arose the sect of the Almohades (q.v.), which after a time expelled the A. from Africa, and in 1144 subdued their power in Spain. It was the Almoravide princes who introduced the *Maravedi* (q.v.) into Spain, and in that and the word *Marabuts* (q.v.) their name is still preserved.

ALMQVIST, KARL JONAS LUDWIG, 1793-1866; a native of Sweden, remarkable in the history of literature. He quitted the university to lead a colony into the wilds of Wermeland; but the utopian colony was a failure; and he settled in Stockholm as a writer, producing several educational works and rising at a bound into fame by his novel *The Book of the Thorn-Rose*. He ran rapidly on with astonishing fecundity of brain, producing lyric, epic, and dramatic poems; philosophical, æsthetical, moral, political, and educational treatises; works on religion, lexicography, history, mathematics, and philology, all good and most of them excellent. He left one political place after another, at last living entirely by literary efforts, and gradually became an extreme socialist. The public was astonished in 1851 to learn that he had been convicted of forgery and charged with murder, and had fled from Sweden. For many years he was not traced, living in the United States under an assumed name, and experiencing a variety of misfortunes, among them the loss of his manuscripts, including several unpublished novels. He finally returned to Europe, still under an alias; and his strange and unhappy career ended at

Bremen in 1866. His romances, as a whole, are considered the best in the Swedish language.

ALMS HOUSE. See POOR.

AL MUG TREE, or **ALGUM TREE**. This name, occurring in the Old Testament, was formerly supposed to denote a species of *acacia*, or a coniferous tree like the cypress; but it is now thought more probable that it was one of the kinds of sandal-wood (q.v.), the red (*pterocarpum santalum*).

ALMUÑECAR (Arab. *Al Munneceb*, the gorge), a seaport town of Andalusia, Spain, in the province of Granada, 31 m. s. of Granada. The port is somewhat exposed. The t. is generally well built. It was a place of importance in Moorish times, when the coast of Granada was highly cultivated and extremely productive, particularly in sugar and cotton. Efforts have recently again been made to extend the culture of both. The inhabitants of A. are chiefly engaged in agriculture and sugar refining. There is a considerable trade in cotton, sugar, and fruit. Pop. 8800.

ALMY, JOHN J., b. R. I., 1814-95; officer in the United States navy. He began as a midshipman, and rose to be commodore and rear-admiral. He was on blockade service during the civil war.

ALMY, WILLIAM, 1761-1836; a Quaker philanthropist, who used much of his fortune in charitable works in Providence, R. I. He endowed the New England Boarding-School, and defrayed the cost of educating 80 students.

ALNUS. See **ALDER**.

ALN WICK (t. upon the Alne), the co. t. of Northumberland, is situated in lat. 55° 25' n., long. 1° 42' w., and is distant about 34 m. from Newcastle. The streets are broad, well paved, and well lighted, the houses modern, built of stone, and in some instances handsome. A large market-place occupies the center of the town. The town-hall is a spacious building crowned with a tower. A. was at an early period a fortified t., and some fragments of the ancient walls even yet remain. An ancient gate, built by Hotspur, still forms one of the entrances to the city. A. castle, the residence of the dukes of Northumberland, stands at the n. entrance of the town. It was repaired some years ago, and is considered one of the most magnificent baronial structures in England. During the middle ages it was a bulwark against the invasions of the Scots, who thrice besieged it. A. is the election t. for the n. division of the county. Pop. '91, 6746.

ALOE (*aloë*), a genus of plants belonging to the natural order *liliaceæ* (q.v.) sub-order *aloineæ*, distinguished by a regular cylindrical perianth in six pieces, expanded at the mouth, and nectariferous at the base, the stamens hypogynous, or springing from beneath the germen, the ovules indefinite in number, the fruit a membranous three-celled capsule. The species are numerous, natives of warm countries, especially of the southern parts of Africa. About 50 m. from Cape Town is a mountainous tract completely covered with aloes, and the hills on the w. side of Socotra exhibit them in similar profusion. The species all have stems, but vary in height from a few inches to 30 ft. They have permanent succulent leaves. The negroes of the w. coast of Africa make cords and nets of the fibers of their leaves, and stockings are woven from the fibers of a species found in Jamaica. But aloes are chiefly valuable for their medicinal properties. The well-known drug called **ALOES** (q.v.) is the inspissated juice of the leaves of several almost tree-like species, and particularly of *A. socotrina*, a native of the island of Socotra; *A. purpurascens*; *A. spicata*, and *A. fruticosa*, which principally yield the cape aloes; *A. Indica*; *A. rubescens*; *A. Arabica*; *A. linguaformis*; *A. Commelini*; and *A. vulgaris*, which is found in the East and West Indies, in Italy, and in some of the islands of the Mediterranean, being the only species which can be reckoned European, although it also is probably an introduced plant. The extract prepared from its leaves is known as hepatic aloes, or as Barbadoes aloes. The bitter principle of aloes has been called aloesin. It forms several compounds with oxygen, which possess the properties of acids. The juice of aloes was anciently used in embalming, to preserve dead bodies from putrefaction. In the East Indies it is employed as a varnish to prevent the attacks of insects; and has even been applied to bottoms of ships to protect them from marine worms. A beautiful violet color is obtained from the leaves of the Socotrine A., which does not require any mordant to fix it. It also affords a fine transparent color for miniature painting.—Mohammedan pilgrims suspend an A. over their doors on their return from Mecca, to signify that they have performed the pilgrimage.

The **AMERICAN A.** is a totally different plant. See **AGAVE**.

ALOES is a drug of great antiquity, for we find Dioscorides (50 A.D.) making mention of *aloë* as a substance obtained from a plant, and possessing cathartic properties. The great demand for A. in Britain has led to its importation from numerous sources, including Bombay, Arabia, Socotra, Madagascar, the cape of Good Hope, the Levant, and the West Indies. The drug is the inspissated juice of various species of aloë (q.v.). All these are characterized more or less by producing large, thick, fleshy leaves, stiff and brittle, pointed, and generally terminating in a strong spine, filled with a mucilaginous pulp internally, and containing in the proper vessels of their exterior portion an intensely bitter juice, which yields the medicinal substance A. It is obtained, sometimes in the

form of tears, by incision, spontaneous exudation, and inspissation upon the plant; sometimes by spontaneous evaporation of the juice which drops or exudes by pressure from the leaves when cut away near the base; sometimes by evaporating the same juice with the aid of heat; and lastly, by evaporating together the juice and the decoction of the leaves.

Owing to the great difficulty of determining the true botanical source of any given sample, the following names are made use of in commerce to denote the various kinds of A. found in the market—namely, Socotrine, Clear, Cape, East Indian, Barbadoes, and Caballine A. The most important are:

1. Socotrine A. (*Aloë Socotrina*), so called from its supposed source, the island of Socotra, near the mouth of the Arabian gulf. This is the most esteemed of all the varieties used in medical practice. Many hold that this is only a fine variety of East Indian A., but the characters given in the *Edinburgh Pharmacopœia*—a garnet-red translucency in thin pieces, and almost complete solubility in spirit of the strength of sherry—define a particular species, which is the true Socotrine A. of pharmacologists.

2. East Indian A. (*Aloë Indica*), also called hepatic A., from its liver-brown color, is imported into Bombay from Arabia and Africa, and is known in India by the name of Bombay A. A considerable portion is probably obtained from the same sources as the Socotrine A., which it resembles in color; and according to Dr. Pereira, "the two are sometimes brought over intermixed, the Socotrine occasionally forming a vein in a cask of hepatic A."

3. Barbadoes A. (*Aloë Barbadosensis*) is prepared in the West Indies from A. *Socotrina*, and from a variety of A. *vulgaris*. We learn from Browne's *Natural History of Jamaica* that the largest and most succulent leaves are placed upright in tubs, that the juice may dribble out. This evaporated, forms what is sold as Socotrine A.; but the common A. is obtained by expressing the juice out of the leaves, boiling it with water, evaporating and pouring it into gourds; whence this kind is often called gourd A. It is much used for veterinary medicine, and thus brings a high price in the market.

Caballine A. (*Aloë caballina*) is a very coarse kind, and is so called because it is considered fit only for horses. It contains many impurities, such as wood, sand, and charcoal, and evidently constitutes the lowest stratum in the vessels in which the better sorts are allowed to cool. It is now in a great measure superseded in veterinary practice by Barbadoes A.

All kinds of A. are remarkable for their disagreeable taste. The odor is peculiar, and is more perceptible when the drug is breathed upon. A. is in a great measure soluble in water, and more so in hot than cold water. A. was formerly considered to be a gum-resin; but the portion which was thought to be of the nature of gum is now regarded as a variety of *extractive*, and to it the name of aloesin has been given.

Action.—When employed in small doses, A. exerts a tonic, and in larger doses, a cathartic action. It is considered by some authorities to stimulate the liver, and also to supply the place of deficient bile in torpidity of the intestinal canal, and more especially towards its lower part. Both taken singly, and also in combination with other cathartics, A. is perhaps the most important and the most extensively used of vegetable remedies of its class; and there is no end to the variety of cases in which it may be employed with advantage.

ALOE WOOD (called also agila wood, eagle wood, or agallochum) is the inner part of the trunk of *aquilaria ovata* and *a. agallochum*, trees of the natural order *aquilariaceæ* (q.v.), natives of the tropical parts of Asia, and supposed to be the aloes or lign aloes of the Bible. They are large spreading trees with simple alternate leaves. Aloes wood contains a dark-colored, fragrant, resinous substance, and is much prized in the east as a medicine, and for the pleasant odor which it diffuses in burning. It has been prescribed in Europe in cases of gout and rheumatism. The resinous substance is found only in the inner part of the trunk and branches; the younger wood is white, and almost scentless. A similar substance, still more esteemed, is obtained in the south-eastern parts of Asia and the adjacent islands, from the central part of the trunk of *aloezydon agallochum*, an upright-growing tree with simple alternate leaves, and terminal panicles of small flowers, of the natural order *leguminosæ*, sub-order *cæsalpinieæ*. This tree abounds particularly on the highest mountains of Cochin-China and the Moluccas; a character of sacredness is attached to it, and it is cut with religious ceremonies. The A. W. which it yields is not only much prized in the east as a perfume, but many medicinal virtues are ascribed to it. The ancients ascribed to it similar virtues, and so valued it for these and its fragrance, that Herodotus says it once sold for more than its weight in gold. It was regarded almost as a universal medicine. Its very fragrance was supposed to have a beneficial influence, and it was therefore worn about the person. As it admits of a high polish, and exhibits a beautiful graining, precious gems were set in it; and it was cut into fantastic forms and worn in head-dresses, etc. There seems to be allusion to a similar use of it in Psalm xlv. 8, "All thy garments smell of myrrh and aloes and cassia." Or perhaps this merely refers to its being employed to perfume clothing. It was also from a very early period much used to perfume the apartments of the great. The fragrance continues undiminished for years. *Lign aloes* is a corruption of *lignum aloes* (aloes wood).

ALOGIANS or **ALOGI**, a sect of heretics in the second century, who opposed the Montanists (q.v.), denying that Christ was the *Logos* and ascribing the Gospel of St. John and the Apocalypse to the Gnostic Cerinthus. Lardner doubts their existence, but it appears that there were certain opponents of the Montanists who not only denied the prophetic gifts claimed by the latter, but rejected from the creed all those things out of which the error had sprung.

ALOÏ DÆ, or **ALOÏADÆ**, the name of Otus and Ephialtes, legendary sons of Neptune by Iphimedeia, wife of Aloeus. They were celebrated for gigantic stature, being 27 cubits high and 9 broad when but 9 years of age. In the war with the gods they piled the mountain Pelion upon the mountain Ossa, intending to pile both upon Olympus in their effort to scale heaven. Homer says Apollo destroyed them before their beards had grown. Apollodorus says they did pile up the mountains, threatening to change sea into land. It is said they aspired to secure the goddesses for wives, one suing for the hand of Hera, the other for Artemis; but Artemis appeared to them in the form of a stag, running between them; when both shot at the supposed animal, and each killed the other.

ALONG-SHORE, a phrase applied in navigating near a coast, to denote a passage near to, and parallel with, the shore. "Along-shore-men," or "long-shore-men," is a peculiar designation given to some of the humbler and rougher men employed about docks and shipping, in the Hudson and other rivers.

ALOOF, at sea, is simply "at a distance." To "keep the loof," or "keep the luff," is a command given to the man at the helm.

ALOPECIA (Gk., *alopéx*, a fox, because this disease is common among foxes), a disease, called also the *fox evil* or *scurf*, causing a falling off of the hair from any part of the body. See **BALDNESS**.

ALOPECURUS. See **FOXTAIL GRASS**.

ALO RA, a t. of Andalusia, Spain, in the province of Malaga, 18 m. n.w. of Malaga, on an elevated site near the right bank of the Guadalhorce. Some of the streets are well built and well paved; some are very steep and irregular. There are ruins of an ancient Gothic castle. The inhabitants are mostly employed in agriculture. It has mineral springs. The neighborhood produces much oil and excellent wine. Pop. 10,500.

ALO SA. See **SHAD**.

ALOST, or **AALST** (the name signifies "to the east," and was probably given to the town because it lay near the eastern frontier of the province), a t. in Belgium, the old capital of the province of east Flanders, is situated on a tributary of the Scheldt, called the Dender, which is here converted into a canal. It is a walled city with five gates, has considerable trade in hops, corn, etc., and large manufactures, besides numerous breweries, distilleries, bleach-fields, print-works, copper and iron foundries, flax and cotton mills, etc. The finest building in A. is the church of St. Martin, an unfinished edifice, but one of the grandest in Belgium, and containing a famous painting by Rubens—"St. Roch beseeching our Saviour to stay the Plague of A.," and also the mausoleum of Thierry Martens, who was born here, and who introduced the art of printing into Belgium, 1475 A.D. A. has a town-hall (founded in 1200 A.D.), a college, a hospital, chamber of commerce, academy of design, etc. Pop. 1891, 24,479.

ALOYSIA, a genus of plants of the natural order *verbenaceæ* (q.v.), to which belongs a shrub, *A. citriodora*, much cultivated in greenhouses and apartments in Britain for the grateful fragrance which its leaves emit when slightly bruised. It is frequently to be seen in the windows of cottagers, and is by them generally named *verbena*. It was formerly known to botanists as *verbena triphylla*, and has also been referred to the allied genus *lippia*. The leaves are in whorls of three. It is a native of Chili. In the Channel islands and the s. of Ireland, it becomes a luxuriant shrub in the open air, reaching a height of 10 to 25 ft., with osier-like shoots.

ALP, **ALB**, also called the **Rauhe** or **Swabian Alp**, is a chain of mountains above 60 m. in length, and from 12 to 15 in breadth, situated between the Neckar and the Danube. It forms the water-shed between these two rivers and the basin of the Rhine, and lies almost entirely within the kingdom of Württemberg. It is also in the vicinity of the Black Forest, but presents a totally different appearance, on account of its being clothed with forests of hard wood instead of pine. It forms a table-land intersected by a few narrow deep valleys. The average height of the system is rather more than 2000 ft. On the n., it descends to the Neckar in ridges of rocky cliffs, and abrupt pointed headlands; but on the s., it gradually slopes away to the level of the valley of the Danube. The scenery is often very picturesque, for the sharp, precipitous crags are frequently crowned with the strongholds, generally ruins, of the famous old German families, such as the Hohenzollerns, Hohenstaufens, etc. The geological formation of the A. is calcareous, and presents a regular stratification. Caverns of a very remarkable character abound among the rocks. The valleys at the base of the hills are fertile, and produce

abundance of wine and fruit, but the high table-land has an extremely poor and barren soil.

ALPACA, or **PACO** (*archenia paco*; see **AUCHENIA**), an animal of the same genus with the llama (q.v.), and so closely allied to it, that many naturalists regard it as a variety rather than a distinct species. It is remarkable for the length and fineness of the wool, which is of a silken texture, and of an uncommonly lustrous, almost metallic appearance. The A. is smaller than the llama; the legs and breast are destitute of callosities. In form, it somewhat resembles the sheep, but with a longer neck and more elegant head. It carries its long neck erect; its motions are free and active, its ordinary pace a rapid bounding canter. The eyes are very large and beautiful. The wool, if regularly shorn, is supposed to grow about 6 or 8 in. in a year; but if allowed to remain upon the animal for several years, attains a much greater length, sometimes even 30 in., and not unfrequently 20. Its color varies; it is often yellowish brown; sometimes gray, or approaching to white; sometimes almost black.

The A. is a native of the Andes, from the equator to Terra del Fuego, but is most frequent on the highest mountains of Peru and Chili, almost on the borders of perpetual snow, congregating in flocks of one or two hundred. In a wild state it is very shy and vigilant; a sentinel on some elevated station gives notice of the approach of danger by snorting to alarm the flock. Alpacas seem instinctively to know when a storm is coming on, and seek the most sheltered situation within their reach. Flocks, the property of the Peruvian Indians, are allowed to graze throughout the whole year on the elevated pastures, and are driven to the huts only at shearing-time. When one is separated from the rest, it throws itself on the ground, and neither kindness nor severity will induce it to rise and advance alone. It is only when brought to the Indian huts very young, that they can be domesticated so as to live without the companionship of the flock; but then they become very bold and familiar. Their habits are remarkably cleanly.

The Indians have from time immemorial made blankets and ponchos or cloaks of A. wool. It is not quite fifty years since it became an article of commerce, but its use for the manufacture of shawls, coat-linings, cloth for warm climates, umbrellas, etc., has gradually increased, and more than 3,500,000 lbs. are now annually imported into Britain. The credit of introducing and raising to its present magnitude the A. wool-manufacture in Britain, is due to Sir Titus Salt.

Attempts have been made to introduce the A. into Europe; but not yet with very satisfactory results. The only considerable flock lately existing was in the Pyrenees. There seems no reason, however, to doubt that the mountains of Wales and Scotland are suitable for this branch of husbandry; and it is to be hoped that enterprise such as has been directed to the manufacture of A. wool in Britain, will soon, and with equal success, be directed to the production of it. There are probably not yet more than two or three hundred alpacas in Britain, and these mostly in parks connected with the residences of noblemen and gentlemen, not in the situations for which they seem to be peculiarly adapted. An attempt was made in 1821 to introduce the A. into the United States; a fund was raised, and, in 1857, a cargo of them was shipped to Baltimore, but the result showed that they could not be acclimatized.

A. wool is straighter than that of the sheep, very strong in proportion to its thickness, and breaks little in combing. The fiber is small, and it is very soft, pliable, and elastic. —The flesh of the animal is said to be very wholesome and pleasant.

ALP-ARSLAN, a Persian sultan, the second of the Seljukide dynasty, b. in Turkestan in 1028 or 1030. In 1053, he ascended the throne of Khorassan, after the death of his father Daoud, and in 1063 he became sultan of Oran. His first act was to unite the whole of his dominions in one vast monarchy. He next embraced Islamism, and it was on this occasion that he took the surname of Alp-Arslan (the lion-heart), his real name being Mohammed-Lhaz-ed-Dyn-Abou-Choudja. The caliph of Bagdad gave him the title of Adhad-eddin (defender of the faith), with this extreme honor—namely, that prayer should be made in his name. He had an excellent vizier, Nisam-al-Mulk, one of those lettered ornaments of early Mohammedanism. This vizier was the founder of all the colleges and academies in the kingdom. While he directed the internal administration of affairs, A. made war successfully. He suppressed revolts, and extended the northern boundaries of his dominions. From 1064 to 1071, he pursued the course of his conquests, carrying off the gates of the church of St. Basil at Casarea, which were enriched with gold and pearls, and overthrowing the Greeks under Nicephorus Botoniates. In 1069, he invaded Armenia and Georgia, at that time Christian kingdoms. The most remarkable incident in this expedition was the blockade of the convent of Mariam-Nishin, situated on an island in the middle of a lake, and considered impregnable. An earthquake overthrew the walls during the siege, when it immediately surrendered. He next proceeded against the Greeks, who, under their brave emperor, Romanus IV., had thrice driven back the Turks beyond the Euphrates. In Aug., 1071, a bloody battle was fought near the fortress of Malaskerd, between the towns of Van and Erzeroum. A. gained the victory. The Greek emperor was taken prisoner, and only obtained his liberty by a ransom of £1,000,000, and an annual tribute of £160,000. Rather more than a year after this (Dec. 15, 1072), A. perished at Berzem in Turkestan by the poniard of Jussuf Kothual, whom he condemned to death. He was buried at Merv.

ALPENA, a co. in n. e. Michigan, on lake Huron, drained by Thunder Bay river; 700 sq. m.; pop. '90, 15,581. Co. seat ALPENA.

ALPENA, city and co. seat of Alpena co., Mich., on Thunder Bay, and Detroit, Bay City and Alpena railroad, 125 miles n.e. of Saginaw City. It has high and graded schools, newspaper offices, banks, foundries, paper and spool factories, lumber mills, etc. It exports large amounts of lumber. Pop. 1880, 6153; 1890, 11,283.

ALPENHORN, a straight instrument about three feet long, and made of wood and bark, with a cupped mouthpiece. It is used by the Swiss to convey signals and to play simple melodies. The notes are the open harmonics of the tube, the quality of tone being modified by the material, and by the smallness of the bore in relation to the length of the tube. The melody usually played on this instrument is called the *Ranz des Vaches* (q.v.), which tune has been introduced into the overture of Rossini's *William Tell*, by Beethoven in his *Pastoral Symphony*, op. 68, and by Schumann in his music to Byron's *Manfred*, op. 115. The Alpenhorn is usually represented in the orchestra by the oboe, English-horn, or the bassoon. The Swedish *Lure* resembles the Alpenhorn, and kindred instruments are used in the Himalayas.

ALPENSTOCK (Ger., *Alp*, Alps, *Stock*, staff), a long staff, pointed with iron, used in traveling among the Alps or other mountains.

ALPES is the name of two departments in France, the *Basses-Alpes* (or lower Alps) and the *Hautes-Alpes* (or upper Alps). The department of the BASSES-ALPES occupies the n.e. part of Provence, and includes an area of 2685 sq.m. It is, for the most part, mountainous, consisting of spurs or offshoots from the Maritime Alps, which run in numerous chains towards the Rhone. In the n., the climate is cold, the soil poor, and the cultivation bad; in the s., the climate is much better—almonds, apricots, peaches, and various other choice fruits are grown, amongst which the plums of Bignolles form a well-known article of commerce. The wines of this region are reckoned excellent. On the sides of the Alps oxen and sheep find admirable pasturage. The mines produce lead, green marble, etc. At Digne and Gréoulx there are hot mineral springs. Pop. '96, 118,142; the trade carried on is insignificant. The chief t. is Digne; pop. 5540.

The HAUTES-ALPES, lying n. of the Basses-A., and forming a part of the old province of Dauphiné, is traversed by the chief range of the Cottian Alps, which here rise, in Mt. Pelvoux, to the height of 13,400 ft., and Mt. Olan to 13,120 ft. The scenery, especially along the course of the impetuous Durance, is singularly picturesque. The area is 2158 sq.m.; pop. '96, 113,229.

ALPES MARITIMES, a dep. of France, in the extreme s.e., on the shores of the Mediterranean and confines of Italy, formed in 1860, of the ancient co. of Nice, then ceded to France, and formerly belonging to the kingdom of Sardinia, and of the arrondissement of Grasse, detached from the department of Var. The chain of the A. M. forms the northern boundary of the department, and from it numerous spurs run seaward, among which are lovely and fertile valleys. The chief rivers of the department are the Loup, the Var, and the Paillon, at the mouth of which Nice is situated. The climate is mild and pleasant in the vicinity of the sea, and in the lower valleys, although the higher mountains reach to altitudes where winter always reigns. The vine and olive are much cultivated in the more favored localities; oranges, lemons, and figs are produced in abundance and of excellent quality; a considerable extent of land is devoted to tobacco, and not a little to the cultivation of herbs and flowers for the preparation of essences and perfumes. Grasse is particularly famous for the manufacture of perfumery. In many parts of the department, there are noble forests. In the more elevated parts, much land is used for the pasture of sheep, and also of goats, of which these regions possess a highly esteemed breed. The silk-worm is reared to a considerable extent, and the keeping of bees is a source of no little wealth, honey being largely produced and exported. The mineral riches are not great. There are some quarries of white marble, and some mineral springs. Among the chief branches of industry, besides those which are strictly rural, are brass-founding and the making of bijouterie. The tunny, anchovy, and sardine fisheries give employment to many people on the shores of the Mediterranean, and great quantities of anchovies and sardines are exported from the port of Cannes. The department is divided into three arrondissements—Nice, Puget-Théniers, and Grasse. The capital is Nice (q.v.), and the other principal towns are Antibes (q.v.), Villefranche, Cannes (q.v.), Grasse (q.v.), and Menton, or Mentone (q.v.), on the eastern frontier.—The co. of Nice was bestowed in 1388 on Amadeus VII., duke of Savoy, and latterly formed part of the kingdom of Sardinia till 1860, except that it was seized by France in 1792, and for a time formed into the department of Alpes Maritimes. It was restored to Sardinia in 1815. After the treaty of 1860 was concluded, it was apprehended that the people of this region, on account of their race, customs, and language, would not show the same willingness to be transferred to France as the people of Savoy; but no transference of territory was ever more easily accomplished, or with less apparent dissatisfaction of those most nearly concerned. The pop. of the dep. in 1886 was 238,057; in 1891, 258,571; and in 1896, 265,155.

ALPHABET. The A. of any language is the series of letters, arranged in a fixed order, with which that language is written. Picture-writing was doubtless the earliest method invented of conveying thought through the eye. The idea of an ox was readily expressed by a sketch of the animal, or, for shortness, by an outline of his head and

horns. Or the picture was used symbolically; as the figure of an eye, to express the action of seeing, or the attribute of wisdom. In process of time, some of those pictures came to be used phonetically—i.e., to represent, not ideas, but sounds. But the sounds so represented would at first be whole words, or, at all events, syllables; and the important step was yet to be taken of analyzing syllables into their elementary sounds, and of agreeing upon some one unvarying picture or sign (a letter) to represent each. This constituted the invention of the A. By what steps alphabetic writing most probably rose out of picture-writing, will be seen under the head of **HIEROGLYPHICS**. See also **CHINESE LANGUAGE AND CUNEIFORM CHARACTERS**.

Taylor (*The Alphabet*, 1883) proves Rougé's theory that the Phœnician, the oldest true A., is derived from an old hieratic series of alphabetic symbols, compiled by the Egyptians out of their hieroglyphs, but not used simply as an A.; this was a Phœnician invention or discovery. From Phœnician and cognate Shemitic alphabets have originated almost all the modes of writing now used. Hence came Greek, Latin, Hebrew, Arabic, and the Indian alphabets. Chinese, and apparently ancient Hittite, Syrian and Cypriote syllabaries were distinct. As many as 400 alphabets have been enumerated; but of those now in use, if we set aside slight variations of form, the number does not exceed 50. Auer's *Sprachhalle* (Vienna, 1849) contains a rich collection of alphabets. We must confine ourselves here to those more immediately connected with the history of the English A.

A point of considerable importance is the *order* of the letters. In modern alphabets, this appears at first sight to be quite arbitrary; but traces of a principle of arrangement, or natural system according to which the series grew, have recently been brought to light.* The evidences of such a natural order are best seen in the Hebrew A., which was almost identical with the Phœnician. The following table exhibits the Hebrew letters, with their names, and sounds or powers; and also the names of the letters composing the early Greek A., as borrowed from the Phœnician:

HEBREW.		Sound or Power.	GREEK.
	Name.		
1	א Aleph,	a vowel or breathing.	Alpha.
	ב Beth,	B.	Beta.
	ג Gimel,	G (gun).	Gamma.
	ד Daleth,	D.	Delta.
2	ה He,	a vowel or breathing.	E(psilon).
	ו Vau,	V or F.	Ϝ=V (digamma).
	ז Zayn,	Z.]	Zeta.
	ח Kheth,	KH or CH.	Eta.
	ט Theth,	TH.	Theta.
	י Yod,	J.	Iota.
	כ Kaph,	K, variety of.]	Kappa.
3	ל Lamed,	L.	Lambda.
	מ Mem,	M.	Mu.
	נ Nun,	N.	Nu.
	ס Samekh,	S, variety of.]	Sigma.
4	ע Ayn,	a vowel.	O(mikron).
	פ Pe,	P.	Pi.
	צ Tsadi,	TS.]	
	ק Koph,	K or Q.	Koppa.
	ר Resh,	R.]	Rho.
	ש Sin,	S.]	San.
	ת Tau,	T.	Tau.

Leaving out of account the letters inclosed in brackets, which are not easily accounted for, and are possibly later interpolations, the whole fall into four groups, the law of which will best appear in the following scheme:

Vowels.	Labials. Palatals. Dentals.			
a	b	g	d	Flats or medials.
e	v	ch	th	Aspirates.
o	p	k	t	Sharps.
i	l	m	n	Liquids.

*The theory was first propounded in 1833, by Prof. Key, of University college, London, in the *Penny Cyclopædia*, art. "Alphabet."

Without entering at present into the nature of the relation between the letters in the several rows horizontal and vertical, of the scheme (for which see LETTERS), it will be seen that group (1) in the Hebrew A. consists of a vowel followed by three mute letters, all having one character (flats or medials); that group (2) consists of a vowel followed by three mutes, also having one character (aspirates); and that group (4) consists in like manner of a vowel followed by three mutes, all of the same character (sharps). The order, moreover, according to the organ of utterance, in which the mutes follow in each group, is invariable: the labial (lip-sound) coming first; the palatal (palate-sound), second; and the dental (tooth-sound), last. This principle of arrangement is characterized by Dr. Latham as a *circulating order*. Group (3) likewise consists of a vowel and four consonants of one character (liquids); but in this case the order of the vocal organs is not observed—at least in the form in which the Hebrew A. is known to us; in order to be symmetrical with the other groups, the sequence would require to be *m, l, n*.

The nucleus of the original A. would thus seem to have consisted of 16 letters, grouped in four tetrads or quaternions, on an organic principle of arrangement. This principle is obscured in English and other modern alphabets, by some of the letters having gradually come to represent quite other sounds than their original. There is sufficient evidence, for example, that in the earliest Latin alphabet, from which the English is derived, the third letter, C, had the power of G (in *gun*). There was a subsequent period in the development of that language when the distinction between the sharp and flat palatal sounds seems to have been lost, and when two syllables like *kam* and *gam* would have been both pronounced alike (*kam*). C thus acquired the power of K, and the letter K itself went almost out of use. But about the time of the first Punic war (264–241 B.C.), the distinction between the sharp and the flat sounds revived; and while the original C continued ever after to have the power of K (*Cicero*, for instance, was pronounced *Kikero*), a new character (G) was formed from it, by a very slight alteration, to express the flat sound. Again, the modern H, which has in most cases become a mere evanescent breathing, can be traced back until it becomes a strong guttural, like CH in the Scotch word *loch*. The place of the third consonant in the cycle of aspirates is a complete blank in the alphabets derived from the Latin; because that language being originally destitute of the sound, dropped the sign of it, from the first. The Latins were, in fact, completely destitute of the genuine aspirate sounds; for even the letter F had not the sound we give it. Therefore, when they had to represent the aspirate consonants of the Greek language, *φ, χ, θ*, they had recourse to the combinations *ph, ch, th*—a clumsy expedient still followed in modern alphabets derived from the Roman, and constituting one of their most serious defects.—The cycle of the sharps is pretty perfect in the English alphabet, for Q is only a variety of K.

It is easy to conceive a language represented by 16 characters of the nature above described. The most serious deficiency would seem to be the want of *r* and *s*. But the sound of *th* is very nearly allied to that of *s* (witness “loves or loveth;” also the pronunciation of a person who *lithpth*), and one character might be made to stand for both, as easily as in English *c* is made to represent two sounds so different as those exemplified in *cat* and *city*. Some nations, again, are said to make no distinction between *r* and *l*, so that one character might stand for both these sounds.

But whether or not the Phœnician A. had originally only 16 letters, it is evident that when transplanted into Greece, it had 21 letters, if not 22. In accommodating itself to the necessities of the Greek tongue, it gradually underwent a series of changes. Some of the letters were modified: *He* became *e*; *Cheth*, *ee*; *Sigma* became *ξ = x*, and the name *Sigma* was transferred to *San*. Other letters were altogether dropped, as *Digamma* (= *v*) and *Koppa*. On the other hand, for such simple sounds as had no representatives in the Phœnician, new characters were invented, and annexed to the end (*v, φ, χ, ψ, ω*).

Another important change was in the *direction* of the writing. In the Phœnician and other Semitic languages, the writing proceeded from right to left. The Greeks, on borrowing the Phœnician A., also wrote for some time from right to left. The mode called *bustrophedon* (turning like an ox in plowing), of writing alternately from right to left and from left to right, was then introduced; and finally the direction from left to right prevailed throughout the west, to the exclusion of the other modes.

In the classical period of the Greek language, the A. had come to consist of 24 letters, as in columns 2, 3, 4 of the following table. Column 1 (copied from Ballhorn's *Alphabet*) gives some of the earlier forms of the Greek letters, found on coins and other inscriptions, of the period when writing still proceeded from right to left; column 2 is from the Alexandrian Codex (q.v.), as given in Key's *Alphabet*; and cols. 3 and 4 are the modern printed forms of capitals and small letters. The small characters are merely cursive forms or variations of the capitals; and it would not be difficult to show how, in each case, the endeavor to trace the capital on soft material rapidly and without lifting the hand, would give rise to the form now used as the small letter.

With regard to the *figures* or shapes of the letters, it is believed that they all arose out of pictures or hieroglyphic characters. The names of the Hebrew letters are also the names of material objects; and the letters themselves were at first, in all probability, rude outlines of the objects. Aleph, for example, means an “ox,” and the letter was in its origin an outline of an ox's head. The history of Gimel, which means “camel,”

is probably similar. The Hebrew characters known to us are believed to be comparatively modern, and much corrupted from their original forms, and the likenesses are more difficult to trace in them than in the Samaritan and the early Greek, or even in the Latin. Mem, again, is the Hebrew word for "water," and some of the earliest forms of the letter M are zigzag lines, similar to the sign of *Aquarius* (♒) in the zodiac, intended no doubt to represent the undulations of water. Ayn, the name of the Hebrew letter equivalent to O, also means an "eye," and the picture of an eye would naturally degenerate into a circle, first with a dot in the center (which some ancient O's actually have), and then without a dot.

GREEK ALPHABET					
1	2	3	4	Name.	Power.
Α	α	Alpha	α		
Β	β	Beta	β		
Γ	γ	Gamma	γ		
Δ	δ	Delta	δ		
Ε	ε	Epsilon	ε (short)		
Ζ	ζ	Zeta	ζ		
Η	η	Eta	η (long)		
Θ	θ	Theta	θ		
Ι	ι	Iota	ι		
Κ	κ	Kappa	κ		

1	2	3	4	Name.	Power.
Λ	λ	Lambda	λ		
Μ	μ	My	μ		
Ν	ν	Ny	ν		
Ξ	ξ	Xi	ξ		
Ο	ο	Omikron	ο (short)		
Π	π	Pi	π		
Ρ					
Σ	σ	Rho	ρ		
Τ	τ	Sigma	σ		
Υ	υ	Tau	τ		
Φ	φ	Ypsilon	υ		
Χ	χ	Phi	φ		
Ψ	ψ	Chi	χ		
Ω	ω	Psi	ψ		
		Oméga	ο (long)		

The A. came into Italy not directly from Phœnicia, but from Greece, and that at a time when the Greek A. had undergone some of the changes described above, although not all of them; υ , φ , and χ had been added, but not ψ and ω . Moreover, there must have been distinct and independent importations into more than one part of Italy, and that, probably, from different parts of Greece, or, at all events, at different periods. The Etrurian A. is evidently an earlier importation than the more southerly Latin, as it departs less from the Phœnician. There are even differences in different parts of Etruria itself. The alphabets of Etruria north of the Apennines (for numerous inscriptions recently discovered show that this remarkable race must have extended at one time as far north as the Alpine valleys of Provence, Tyrol, Graubünden, and Styria) differ slightly from the alphabets of the inscriptions in Etruria proper, which are demonstrably taken from the A. of the Greek colony of Cære.

1. a	A, Δ, Δ, Δ	12. m	M, W, W, W
2. b	B, B.	13. n	N, N.
3. c	C, C, C.	14. o	◊, O, O, o
4. d	D.	15. p	□, P.
5. e	E, H.	16. q	Q.
6. f	F, F.	17. r	R, R.
7. z	Z.	18. s	≤, S.
8. h	H.	19. t	Γ, T.
9. i	I.	20. v	(u). V
10. k	K. (E)	21. x	X
11. l	L, L.		

The Latin A., which became that of Rome, and thus of the whole western world, was borrowed from a newer form of the Greek—namely, that imported by the Dorian

Greeks of Cumæ and Sicily. The writing in the oldest Latin inscriptions is never from right to left, as is mostly the case in Etrurian. On the other hand the Kaph and the Koph (K and Q) of the Phœnician, which disappear in Etrurian, are retained in Latin. The Greek A. of Cumæ had not yet received the addition of ψ and ω ; but it still retained the representative of the Phœnician *Vau*, the Digamma, and also *Koppa*, and thus consisted of 24 letters. The Latin tongue, being destitute of aspirate sounds, dropped the three letters θ , ϕ , χ , so that the original Latin A. consisted of 21 letters, the forms of which, as seen on the oldest inscriptions, were as in the following table. See Corsen's *Aussprache, Vocalismus und Betonung der Lateinischen Sprache* (Leip. 1858); Taylor, *The Alphabet*, 2 vols. (1883).

Z was early dropped, and the new letter G (see above) substituted for it; and thus the Latin A. continued to the last to consist of 21 letters, until it was applied to the modern tongues of western Europe. The distinction made between *u* and *v*, and between *i* and *j*, in printing Latin books, is a modern innovation; and no Latin word contains either *y* or *z*. The five additional letters that make up the 26 of the English A., arose from the addition of *z*, and the development of *i* into *j*, and of *u* into *w*, *v*, and *y*.

The Anglo-Saxon A. had two useful letters, which have disappeared from modern English—namely, one for the sound of *th* in *thin*, and one (or rather two) for that of *th* in *thine*. These were derived, in all probability, from the Mæso-Gothic A., which (as well as the Russian and other Slavonic alphabets) was founded on the Greek rather than the Latin. The loss of these letters is owing to the influence of the Norman-French, the alphabet of which is exclusively Latin. The forms of the Anglo-Saxon letters are as under

A	a	(\overline{A})	N	n
Æ	æ	(\overline{E})	O	o
B	b		P	p
C	c	(\overline{C})	R	r
D	d	(\overline{D})	S	s
E	e	(\overline{E})	T	t
F	f	(\overline{F})	U	u
G	g	(\overline{G} 3)	W	w
H	h	(\overline{H} P)	X	x
I	i		Y	y
I	i		Þ	þ
M	m	(\overline{M})	th	th
			th	th

"The characters between brackets were written by the Anglo-Saxons, but, being for the most part mere corruptions of the Roman forms, are now seldom printed."—Vernon's *Anglo-Saxon Grammar*.

The peculiarities of the several letters will be noticed in their proper places. For their classification, and the defects and redundancies of the English A., see **LETTERS AND ARTICULATE SOUNDS**. Other points connected with this subject will be found under **BLACK-LETTER, ORTHOGRAPHY, and PHONETIC WRITING**.

ALPHA AND OMEGA, the first and last letter of the Greek alphabet, employed to convey the idea of completeness or infinity; used in Rev. xxii. 13, to signify Christ in His immeasurable fullness. In early church symbolism the letters combined with a cross in a monogram represented faith in the divinity of Christ, or in Christianity in general.

ALPHEIUS (now Ruféa, Rufá, or Roflá) is the chief river of Peloponnesus (Morea), rising in the s.e. of Arcadia, and flowing w. through Elis, and past the famous Olympia, into the Ionic sea. This river is one of the most celebrated in ancient song, and is connected with a beautiful and characteristic Greek legend. The nature of the upper course of the A. was calculated to affect strongly the imagination of the Greeks. In its passage through Arcadia, a country consisting of cavernous limestone, and abounding in shut-in basins and valleys, it repeatedly disappears under ground and rises again. After these feats, it was capable of anything—even of flowing under the sea—and the Greek colonists of Sicily thought they recognized it in their new country. Close on the margin of the sea in the island of Ortygia (the site of Syracuse), there was a beautiful and copious fountain; and just where the water of this fountain joined the sea, another strong spring bubbled up under the salt water. This could only be another freak of the A.; and it was popularly believed that the sweepings of the temple of Olympia, after the great festival, when thrown into the river, reappeared in the springs at Ortygia. Strabo asserts as a fact that a cup did so.

This wonderful phenomenon found its explanation, as usual, in a myth, connecting it with the history of the gods. The river-god Alpheius became enamored of the nymph Arethusa while bathing in his stream. To escape him, she prayed to Diana, who changed her into a fountain, and opened up an underground passage for her to Ortygia. The river still pursued the object of his love, passing from Greece to Sicily below the sea, without mingling his waters with it, and appearing in the spring that bubbles up by the shore.

ALPHONZO. See ALFONSO.

ALPINE, a co. in e. California, on the Nevada border; drained by the Carson and forks of the Stanislaus and Mokelumne; 1000 sq.m.; pop. '90, 667. Co. seat, Markleeville.

ALPINE CLUB, an English society to promote mountain explorations, formed in 1858. Three members, Lord Francis Douglas, Mr. Hudson, and Mr. Haddo, lost their lives while descending the Matterhorn in July, 1865. There are similar clubs in other countries. See APPALACHIAN CLUB.

ALPINE HUSBANDRY. The characteristic feature of A. farming is, that the preparation of fodder is the chief object, and the cultivation of grain only secondary. In the less elevated regions bordering on the flat country, it is the practice to break up the grass from time to time, and take a succession of grain crops. In more elevated districts, the moisture of the climate and the shortness of the season of vegetation, prevent crops requiring tillage from coming to perfection, and there the whole attention is devoted to pasturage and the preparation of meadow-hay. The top-dressing of the plots devoted to hay-growing, with the solid and liquid manure of the cattle, the cutting and making of the hay, and transporting it to the farm-offices, occupy a great part of the labor of the population of the Alps. They turn to account for hay-making those shelves and crevices among the mountains which are inaccessible to cattle, and even goats; the herbage, which often grows luxuriantly in such situations, is cut, bound up in cloths or nets, and carried down difficult paths on the head, or is flung over the precipices.

The grass-lands in the lower regions near the dwellings being mostly reserved for hay, the cattle are pastured in summer in those regions that lie too high or too remote to be inhabited in winter. These pastures consist of plateaus and slopes, which immediately on the disappearance of the snow, become clothed with a rich carpet of herbage and flowers. Each separate locality or pasture is called an *alp*. Some of these "alps" belong to individuals; others to the commune or parish. The more rocky and steep places are pastured by sheep and goats. There are three zones or stages in the A. pastures. The cattle are driven to the first and lowest stage about the end of May; about a month later, they ascend to the "middle Alps;" and by the end of July, they reach the upper Alps. As the days shorten, they descend in the same gradual way, so that the whole "Alp-time" lasts about 20 weeks. The pastures are provided with huts for those who have charge of the cattle, who also convert the milk into cheese.

ALPINE PLANTS. This appellation is given not only to those plants which are found at elevations approaching the limit of perpetual snow in the Alps of central Europe, but also to plants belonging to other mountainous regions in any part of the world, whose natural place of growth is near snows that are never melted even by the beams of the summer's sun. As the elevation of the snow-line, however, varies very much in different countries, according to the latitude, and also from peculiar local circumstances, the term A. P. is not so much significant of the actual elevation of the habitat, as of the average temperature which prevails there. On the Andes, near the equator, at an elevation of 12,000 to 15,000 ft. above the level of the sea, many kinds of plants are found, of humble growth, resembling in their general appearance those which occur in Germany and Switzerland at an elevation of 6000 ft.; and these, again, either resemble, or are even identical with, the species which in Lapland grow upon hills of very little elevation, or which, in the northern parts of Siberia, are found at the level of the sea. Similar plants occur also in the Himalaya mountains, at elevations varying remarkably within very narrow geographical limits from local causes, which also create great differences in the general dryness or humidity of the atmosphere. The laws of this natural distribution of plants have been in our own day for the first time investigated and elucidated by Humboldt, Wahlenberg, Schouw, Decandolle, and others, and form the most essential part of a branch of science still in its infancy, and much requiring further study, phytogeography, or the science of the geographic distribution of plants. When the A. P. of central Europe are spoken of, those are meant which grow at an average height of 6000 ft., marking what, in the language of phytogeographic science, is called *zone*. This, on its northern limit, the Riesengebirge, or Giants' mountains, falls as low as 4000 ft., and rises, in the southern Alps and Pyrenees, to an elevation of 9000 ft., and sometimes even above it. Although very rich in forms peculiarly its own, this zone contains many plants which are likewise found on much lower hills, and even in the plains. The number of these, however, diminishes as the elevation increases. Hence the small spaces clear of snow in the highest regions possess a very characteristic flora, the plants of which are distinguished by a very low diminutive habit, and an inclination to form a thick turf, frequently, also,

by a covering of wooly hairs, whilst their stems are very often either partly or altogether woody, and their flowers are in proportion remarkably large, of brilliant colors, and in many instances very odoriferous, upon which accounts, they remarkably attract and please the occasional visitors from the plains. In the Alps of central Europe, the eye is at once caught by gentians, saxifrages, rhododendrons, and various species of primrose. With these and other phanerogamous plants, are associated a number of delicate ferns and exceedingly beautiful mosses. The highest mountains in Scotland exhibit a somewhat similar flora, and beautiful plants, both phanerogamous and cryptogamous, are found on them, which never appear in lower situations, as the Alpine speedwell (*veronica Alpina*), the small Alpine gentian (*gentiana nivalis*), the rock scorpion grass, or Alpine forget-me-not (*myosotis Alpestris*), *azalea procumbens*, *woodsia ilvensis*, and *hyperborea*, etc. Many A. P. are limited to a very small district. Thus, the flora of Switzerland differs considerably from that of Germany, the latter being now known to contain 3400 phanerogamous plants, of which the former contains 2200, and along with them also 126 species which have hitherto been found only in the Swiss Alps.—There are, moreover, particular species of plants which are found only in single localities, as *hypericum coris*, upon the mountain of Wiggis in the canton of Glarus; *wulfenia carinthiaca*, upon the Kùweger Alp, in upper Carinthia, and many others. There are, however, many species which, occurring on the mountains of central Europe, appear also in those of Britain and of Scandinavia at lower altitudes, but are not found in the intervening plains. See DISTRIBUTIONS OF LIFE.—Cryptogamic plants are generally found in Alpine regions in much greater abundance than elsewhere. The transplanting of A. P. into gardens is attended with great difficulties, and is rarely successful. Their great beauty, even when dried, makes them favorites with those plant collectors who have amusement more in view than the mere interests of science. Small herbaria of them are offered for sale everywhere in Switzerland; and in some places, large collections have been prepared and thrown open to the public.

ALPINI, PROSPERO, 1553–1617, a Venetian botanist and physician. He served in the army when young, but left it to study medicine, to which he added a passion for botany. Being made physician to the Venetian consul at Cairo, A. spent three years in Egypt in his favorite study. He anticipated Linneus in learning the sexual differences of plants, and one of his papers gave Europe the first notice of the coffee shrub. He filled the botanical chair in the university of Padua for many years. The genus *Alpini*, order *Zingiberaceæ*, is named after him.

ALPINIA. See GALANGALE.

ALPNACH, or **ALPNACHT**, a Swiss village, in the canton of Unterwalden, at the foot of Mt. Pilatus, 1½ m. from that part of lake Lucerne called lake A. It is known principally on account of its celebrated "slide." This was a sort of wooden trough by which the felled timber of Mt. Pilatus was conveyed with amazing velocity from a height of 2500 ft. down to the lake. In order to prevent friction, the trough was perpetually lubricated by a slender rill of water. It is no longer used, the wood being now drawn down by horses and oxen. Pop. about 2000.

ALPS, the most extensive system of lofty mountains in Europe, raise their giant masses on a basis of 90,000 sq. m., between 6° 40' and 18° e. long., and extending in some places from the 44th to the 48th parallel of latitude. The word *Alp* or *Alb* signifies in the Celtic language "height;" but the Latin *albus* (white) may have given the name to these mountains, perpetually crowned with snow. The Alpine system is bounded on the n. by the hilly ground of Switzerland and the upper plain of the Danube; on the e. by the low plains of Hungary; on the s. by the Adriatic sea, the plains of Lombardy, and the gulf of Genoa; and on the w. by the plains of Provence and the valley of the Rhone. A string of lakes encircles both the northern and southern bases of these mountains, the former at an elevation of 1200 to 2000 ft.; the latter, 600 to 700 ft. The varied natural scenery of France, Italy, Germany, and Hungary has a common center of union in this lofty region. Valleys open out in all directions, sending their melted snows on one side into the North sea, on another into the Black sea, and on another into the Mediterranean.

The *water-system* of the A. may be thus briefly sketched: 1. In the basin of the Rhine there is the Rhine itself, which partly forms the lake of Constance, at the north-eastern extremity of Switzerland, and receives on the left the important tributaries of the Thur and the Aar; the latter of which flows through lakes Brienz and Thun, and is itself augmented by various affluents, the largest of which are the Reuss and the Limmat. 2. In the basin of the Danube there flow from the s. the Iller, Lech, Isar, and the Inn. Still further e., the Danube has for its tributaries the Traun, the Eas, the Raab, the Drave, and the Save, the last three of which have their sources in the extreme eastern A. 3. In the basin of the Po there are numerous streams, which rise in the southern A.; the principal of these are the Dora Baltea, the Sesia, the Ticino from lake Maggiore, the Mincio from lake Garda, and the Adige. 4. In the basin of the Rhone there are the Rhone (flowing through the lake of Geneva), and various Alpine tributaries, the most important of which are the Arve, the Isère, and the Durance. 5. The Var is the principal Ligurian coast-stream; the Piave, and the Tagliamento, the largest of those which fall into the Adriatic from the southern A.

Divisions.—In order to give a clear view of the manifold ranges of this mountain-land, a distinction is generally made between the e., the w., and the middle A.; the last of which is again divided into a northern, central, and southern chain; while a natural separation by river-valleys into groups is also made. I. **WEST A.**—The principal ranges of these are: 1. The Maritime A., extending from the middle Durance southwards to the Mediterranean, and rising in the Rocca dell' Argentera to 10,795 ft. 2. The Cottian A., north of these, whose highest summit, monte Viso, is 13,599 ft. 3. The Graian A., forming the boundary between Savoy and Piedmont, and attaining in mont Iséran an elevation of 13,272 ft., and in mont Cenis, an elevation of 11,457 ft. II. **MIDDLE A. Central Chain.**—1. The Pennine A., between the plains of Lombardy and the valley of the Rhone. Highest summits: Mont Blanc, 15,744 ft.; monte Rosa, 15,151 ft.; mont Cervin, 14,836 ft. 2. The Lepontian or Helvetian A., from the depression of the Simplon, along the plateau and masses of St. Gothard (12,000 ft.), to the pass of mont Splügen. 3. The Rætian A., between the Inn, the Adda, and the Upper Adige. *North-ern Chain.*—1. The Bernese A., between the Rhone and the Aar; highest summits: Finsteraarhorn, 14,026 ft.; Jungfrau, 13,716 ft.; Schreckhorn, 13,397 ft. 2. The A. of the four "Forest Cantons," the Schwytz A., etc. *The Southern Chain.*—1. The Oertler A., between the Adda and the Adige; highest summit, Oertlerspitz, 12,822 ft. 2. The Trientine A., between the Adige and the Piave; highest summit, La Marmolata, 9802 ft. III. **EAST A.**—The principal chains of these are: 1. The Noric A., between the plains of the Drave and the Danube; highest summit, Gross-Glockner, 12,431 ft. 2. The Carnic A., between the Drave and the Save. 3. The Julian A., between the Save and the Adriatic sea; highest summit, mont Terglu, 9366 ft.

Elevation.—With respect to height, it is a general rule that the A. are lowest where the system is broadest, that is, in the e., and highest where the system is narrowest, that is, towards the w. Making a threefold distinction of crests, summits, and passes, the principal ranges may be characterized as follows: The crest-line: (1) of west A., 6000 to 11,000 ft.; (2) of middle A., 9000 to 13,000 ft.; (3) of east A., 3600 to 9000 ft. The summits: (1) of west A., 9000 to 14,000 ft.; (2) of middle A., 9000 to 15,800 ft.; (3) of east A., 6000 to 12,000 ft. Height of the passes: (1) of west A., 4000 to 8000 ft.; (2) of middle A., 6500 to 11,000 ft.; (3) of east A., 3500 to 6000 ft.

A comprehensive classification leads to a division of the elevations into three regions: 1. The lower range forming the buttresses of the main masses, and reaching a height of 2500 to 6000 ft.; that is, to the extreme limit of the growth of wood. 2. The middle zone lying between the former limit and the snow-line, at the elevation of 8000 to 9000 ft. 3. The high A., rising to 15,744 ft. The middle zone forms the region of mountain-pasturages, where the characteristic Alpine dairy-farming is carried on. These pastures consist of a rich carpet of grass and flowers. This threefold division of heights, however, does not everywhere coincide with the same phenomena of vegetation: the line of perpetual snow descends lower on the n. side, and the boundaries of the zones above described vary accordingly. 1. The line of demarcation between the region of mosses and Alpine plants and that of perpetual snow, is from 8000 to 9000 feet on the northern declivities; but on the southern it approaches 10,000 ft. 2. The highest limit to which wood attains on the n. is about 6000 ft., while on the s. it is nearly 7000 ft. 3. Grain, beech, and oak on the n. disappear at the elevation of 4000 ft.; on the s. they contrive to exist some hundreds of ft. higher. 4. The region of the vine, as well as of maize and chestnuts, extends to an elevation of 1900 ft. on the northern declivity, and on the southern declivity to 2500 ft. The ranges of outlying lower mountains which flank the high central A. on the n., e., and w. are mostly wanting on the s., especially where the middle A. descend into the plains of Lombardy. Thus the A. rise in steep rocky precipices from the level of the flat plains of the Po, whilst they sink more gradually into the plains on the n.; hence their mighty masses closely piled together present an aspect from the s. more grand and awful; from the n. more extended and various.

Valleys.—The variety of the valleys as to form and arrangement is not less striking than in the elevations. Most worthy of notice is the characteristic form of the wide longitudinal valleys that lie at the foot of the high central chains. On the e. side they open directly into the plain; on the n. they are connected with the plain through transverse valleys which often end in lakes. The transverse valleys on the s. side are mostly in the shape of steep rocky ravines, forming in some parts long-stretching lakes. Besides the deep-sunk principal valleys, there are extensive series of basin-shaped secondary valleys, which are the scenes of Alpine life, properly so called. Many of the Alpine valleys have names distinct from the rivers flowing through them. Thus, the valley of the Rhone is styled the upper and lower Valais; that of the Adda, the Valte-line; of the Arve, Chamounix.

Communications—Passes.—The valleys of the high A. form the natural means of communication. Some are more accessible than others. The entrance into a longitudinal valley is almost always smooth and easy; art has often had to force an entrance into a transverse valley. On many of the high-roads which link the principal with the secondary valleys, it has been found necessary to blow up long ridges of rock, to build terraces, to make stone-bridges and long galleries of rock as a protection against avalanches, as well as to erect places of shelter (*hospices*) from storms. The construction of these roads may be reckoned among the boldest and most skillful works of man. In crossing the A.,

several defiles (usually seven) have to be traversed; for in addition to the pass of the main crest, there are other defiles on both sides at the entrance of the different valleys. In the e., the number of these narrow passes or defiles is considerably increased. The names applied to the Alpine passes vary according to their natural features or the local dialect; as Pass Sattel (saddle), Joch (yoke) Scheideck, Klaus, Col, Chiusa. The traveler, in the course of a day's journey, experiences a succession of climatic changes, which is accompanied with an equal variety in the manners of the people.

No lofty mountains in the world can boast of being so easily crossed as the European A. Hence we can understand how the plains of upper Italy, accessible from the French, German, and Hungarian sides, have been the theater of bloody strife for ages. The passage of the West A. is made by five principal roads: 1. The military road, La Corniche, a coast-road at the foot of the A. from Nice to Genoa, parallel to which a railway now runs. 2. The causeway over the Col-di-Tenda, between Nice and Coni, made in 1778; highest point, 5890 ft. 3. The high-road over Mt. Genèvre, connecting Provence and Dauphiné with Turin; highest point, 6550 ft. 4. The carriage-road made by Napoleon in 1805, over Mt. Cenis, connecting Savoy with Piedmont; highest point, 6770 ft. Near this the chain is pierced by the railway tunnel (see TUNNEL, and CENIS). 5. The pass of the Little St. Bernard, connecting Geneva, Savoy, and Piedmont; highest point, 7190 ft. By this pass Hannibal crossed into Italy. It is not much used now. Besides these great roads, there are many smaller ones branching off from them, which form a pretty close net-work of communication. The passage of the MIDDLE A. is made by eight principal roads: 1. That of the Great St. Bernard, connecting the valley of the Rhone with Piedmont; highest point, 8170 ft. It was crossed by Napoleon in 1800. 2. The magnificent road over the Simplon, constructed by Napoleon, 1801-1806, and connecting the Valais with the confines of Piedmont and Lombardy; highest point, 6570 ft. 3. Between the Great St. Bernard and monte Rosa is the Col of mont Cervin, the loftiest pass in Europe, being nearly 11,200 ft., connecting Piedmont with the Valais. 4. The pass of St. Gothard, connecting Lucerne with Lago Maggiore; highest point, 6800 ft. It is about to be crossed by a railway. 5. The Bernardin pass, made 1819-23, by the Swiss Grisons and Sardinia; highest point, 6800 ft. 6. The Splügen pass, repaired in 1822, connecting the sources of the Rhine with the Adda. This pass was the one used by the Romans in their intercourse with the countries bordering on the Danube and the Rhine, and also by the German armies on their marches into Italy in the middle ages. 7. The Wormser Joch, also called the Orteles pass, or road, opened by Austria in 1824. It is the loftiest carriage-road in Europe, and connects the Tyrol with Lombardy. 8. The Brenner pass, known to the Romans. It also connects the Tyrol with Lombardy; highest point, 4650 ft. It is now crossed by a railway. Besides these great roads, leading s. into Italy, there are two which lead n. from the valley of the Rhone, and cross the Bernese A., over the Grimsel pass, 6500 ft. high, and the Gemmi pass, 7400 ft. high. The roads over the EAST A. are much lower and also much more numerous than those in the MIDDLE or WEST A. The principal are: 1. The road from Venice to Salzburg, crossing the Noric A. at an elevation of rather more than 5100 ft. 2. The road over the Carnic A., which divides into three branches—the first leading to Laybach; the second, to the valley of the Isonzo; and the third, to the valley of the Tagliamento. 3. The roads from the Danube at Linz to Laybach.

Geology.—The A. offer a rich field for geological investigations, the results of which hitherto may be thus summed up: The highest central mass—the primary A., as they are called—that rises from the plain to the s.w. of Turin, and stretches in a mighty curve to the Neusiedlersee, in Hungary, consists chiefly of the crystalline rocks gneiss and mica-slate, with a much smaller proportion of granite. Inclosed among the central A. appear representatives of the carboniferous and jurassic formations; but so altered and become so crystalline that their age can only be guessed from a few remaining petrefactions, which are accompanied here and there by garnets. In the Graian, Pennine, and Rhaetian A. occur great masses of serpentine; in the n. of Piedmont, and in the upper valley of the Adige, quartz-porphyry. In the e. there are, on the n. and s. sides of the chief range, vast deposits of clay-slate and grauwacke mixed with transition limestone.

Beginning on the Mediterranean coast, and following in general the direction of the central chains, a belt of sedimentary rocks runs along the w. and n. sides to the neighborhood of Vienna. On the s. side a similar belt runs from lake Maggiore to Agram. The undulating curves and colossal dislocations presented by these regions show that the form of their mountains must have been the result of a mighty force acting northwards and southwards from the central A. In respect of age, these sedimentary or calcareous A. include all the members of the series of formations from magnesian limestone up to the lowest strata of the tertiary group. The south-eastern portion of these calcareous mountains, forming the Julian A., mostly consist of cavernous rocks of the jurassic and chalk groups; and are continued with this character into Dalmatia.

Minerals.—Precious stones are found in abundance in the trap and primary mountains, especially in the region of the St. Gothard. The rock-crystal of St. Gothard has a world-wide reputation. Mining and smelting become more and more productive as we advance eastward. Switzerland itself is poor in useful ores. Gold and silver are found in Tyrol, Salzburg, and Carinthia; there are also silver-mines in Styria and Illyria, and one near Grenoble, in France. Copper is found in the French A. in Tyrol, and Styria.

The lead-mines near Villach, in Carinthia, yield yearly about 35,000 cwt. The yield of iron in Switzerland, Savoy, and Salzburg is trifling; Carinthia, on the other hand, produces 260,000 cwt., and Styria 450,000 cwt. Quicksilver is extracted at Idria, in Carniola, to the amount of 1000 to 1500 cwt. The Alpine region is rich in salt, especially at Hall in Tyrol, and Hallein in Salzburg. Coal is found in Switzerland, in Savoy, and in the French A., but in no great quantity; the Austrian A. are, again, richer in this important mineral. The mineral springs, hot and cold, that occur in the region of the A. are innumerable. See AIX, ISCHL, LEUK, BADEN, etc.

Animals.—The Alpine mountains present many peculiarities worthy of notice in the animal as well as in the vegetable kingdom (see ALPINE PLANTS). On the sunny heights the number of insects is very great; the butterflies are especially numerous. There are few fishes, although trout are sometimes caught in ponds even 6000 ft. above the level of the sea. Although the lofty mountains are inhabited by eagles, hawks, and various species of owls, yet the birds are few in comparison with the numbers in the plains, and those few are mostly confined to the larger valleys. Among the quadrupeds, the wild goat is sometimes, though rarely, to be met with; the chamois is more frequently seen, chiefly in the eastern districts. The marmot inhabits the upper Alpine regions. Wolves are seen more frequently in the w. than in the e.; in the latter, on the other hand, bears, lynxes, and wild-cats are found, although constantly diminishing in number. Of the domestic animals, goats and oxen are scattered everywhere in large herds. There are fewer sheep and horses, and these are not of good breeds. Mules and asses are used more frequently in the s. than in the n., especially as beasts of burden. Swine and dogs are not common; the latter are used almost solely by the herdsmen, or are kept in the hospices, to assist in searching for the unfortunate wanderers who may be lost in the snow.

The Alpine mountains are rich in singularly beautiful natural scenery, of which the inhabitants of flat countries can scarcely form an idea. Nature in the A. has an infinite variety of aspects. Here the hardened masses of the icy glacier cover the naked rock, avalanches are hurled into immeasurable abysses, the fall of rocks or mountain-slips overwhelm the dwellings, and cover the fields in the valleys; and in the e., the *bora*, with its hurricane strength, hurls before it the upraised masses of snow. There the sun glances upon the scattered silver threads of a water-fall, or mirrors himself in the peaceful waters of a glassy lake, while his rising and his setting are announced to the expectant traveler by the ruddy glow on the snowy mountain-tops. The inhabitant of the A., surrounded on every side by mountains, is unconsciously subdued by their presence, and receives from them a peculiar stamp of character; their dangers fascinate him as well as their charms. The most ceaseless variety of occupation demands all his time and his thoughts; in the mountains he acknowledges his only despots, who seize his soul, and lead it unresistingly. In his constant struggle with the elements, the Alpine dweller strengthens both his mind and body; he opens his heart to the impressions of nature; he gives utterance to his childlike gladness in simple songs, and at the same time defends with self-sacrificing devotion his mountain-fortresses against foreign aggression. But the manners and spirit of the neighboring plains have penetrated into the larger valleys along with the dust of the highway. There the true Alpine life has more and more passed away. The simplicity and characteristic industry of the Alpine farms are now preserved only in the higher secondary valleys.

Six states share the A. The western portion is shared by France and Italy. Switzerland claims the middle A. almost exclusively for her own. Bavaria has only a small share. Austria has the largest share of the A.—in the provinces of Tyrol, Illyria, Styria, and the archduchy. The wide valleys opening to the e. allow the civilization of the plains to enter easily among the mountains. The value of the minerals, and the fertility of the soil, have permitted mining, manufactures, and agriculture to take firm root, and a flourishing trade has caused large towns to usurp the place of mere Alpine villages. In the Tyrol, the pastoral life of the mountains has long been mixed up with the working of mines of salt or other minerals. The inhabitants of whole valleys are occupied in various branches of industry to a greater extent than in any other district of the A., and their sons travel far and near as artisans. See H. and A. Schlagintweit, *Researches into the Physical Geography of the A.* (*Untersuchungen über die die Physikalische Geographie der Alpen*), Leip. 1850.

ALPUJAR RAS (a corruption of an Arabic word which signifies "grass"—an allusion to the splendid pasturage on the n. side), a range of mountains parallel to the Sierra Nevada, and approaching the coast of the Mediterranean sea. Their southern side is precipitous, but the northern slopes away into broad valleys, beyond which rises the Sierra Nevada. They commence in the w. at Motril, where they are separated by the Guadalfeo from the lower Sierra de Holucar, and the adjacent vine-covered hills of Malaga, and stretch as far e. as the river Almeria. The range is divided into two parts by the Adra, each of which bears a particular name. The highest peaks reach an elevation of 7000 ft. On the n. side, owing to the copious rains, there is the richest pasturage, both in the deep valleys and on the uplands. The southern slope, however, is almost destitute of trees or shrubs, with the exception of the fertile valleys near the sea, which are abundantly watered by numerous little streams. Here flourish, under an almost tropical climate, all

the products of the south, even the date-palm and the sugar-cane. The inhabitants are chiefly employed in rearing sheep, and in cultivating the vine and other fruits. A little mining also goes on. Lead, antimony, and silver are got. The Moorish element is still quite discernible in the population of this mountain region.

ALREDUS, or **ALRED**. See **ALURED**.

ALSACE, a German district, forming, along with Lorraine, an imperial territory (Reichsland), reunited (all but the small district of Belfort) to that country in 1871, after two centuries' possession by France. It lies between the Rhine on the e. and the Vosges mountains on the w., extending s. to Switzerland, and n. to Rhenish Bavaria, and occupying 3200 square miles. It is exceedingly fertile; rich also in mines and manufactures; and contains the important cities of Strasbourg, Colmar, and Mülhausen. In Cæsar's time, A. was occupied by Celtic tribes; but during the decline of the empire, the Alemanni and other tribes from beyond the Rhine occupied and completely Germanized it. It afterwards formed part of the German empire, under various sovereign dukes and princes, latterly of the house of Hapsburg; till a part of it was ceded to France at the peace of Westphalia, and the rest fell a prey to the aggressions of Louis XIV., who seized Strasbourg (1681) by surprise in time of peace. By the peace of Ryswick (1697), the cession of the whole was ratified. Thus—as the Germans used to complain—was this fine land, and one of the noblest branches of the race alienated, from the German people, and the command of the German Rhine disgracefully surrendered to the enemy in the time of misfortune, and, more disgraceful still, not demanded back when fortune favored. German never ceased to be the language of the people, and all newspapers were, during the whole period of the French possession, printed in both languages. The language question agitated the province again, in 1883, when an attempt was made to banish French from the schools, by devoting but two hours weekly to its study, instead of four, and by compelling the use of the German language in the deliberations of the provincial committee.

Alsace-Lorraine has an area of 5601 sq. m., with a pop. in 1895 of 1,640,986, which is 293 per sq. m. It is administratively divided into three districts: Ober-Elsass, Unter-Elsass, and Lothringen. The area and population are as follows:

District.	Area sq. m.	Pop. Dec. '90.	Pop. Dec. '95.
Ober-Elsass.....	1,354	471,609	477,477
Unter-Elsass.....	1,846	621,505	638,624
Lothringen.....	2,401	510,392	524,885
Total.....	5,601	1,603,506	1,640,986

In Alsace-Lorraine the annual increase in population from 1875 to 1880 was 0.45 per cent.; 1880-85 an annual decrease of 0.03 per cent.; 1885-90 an annual increase of 0.5 per cent. The census of 1890 showed 1,227,225 Roman Catholics, 337,476 Protestants, a few members of other Christian sects, and 34,645 Jews. About 1,393,000 were German and 210,000 of French origin. The three principal cities are Strasbourg, capital of Ober-Elsass, pop. 135,313; Mülhausen, capital of Unter-Elsass, pop. 83,040, and Metz, pop. 59,728. The constitution of the German empire was introduced Jan. 1, 1874. The administration is under a governor-general bearing the title of "Statthalter," and under him are governors for the three districts. The revenues are derived largely from customs and indirect taxes.

ALSA'TIA, the popular name of Whitefriars, London, which served early in the 17th c. as a refuge for criminals; but this immunity was abolished by parliament in 1697.

AL'SEN (Dan. *Als*), an island in the Baltic, in the Prussian province of Slesvig-Holstein, and extending from the Apenrade to the Flensburg Fiord, is separated from the mainland by the sound of A., in part very narrow but deep. Its greatest length is nearly 20 m.; its greatest breadth about 12; lat. 54° 46' n., long. 9° 52' e. The island, one of the finest in the Baltic, has a picturesque appearance, is very fertile, with rich woods, and numerous lakes abounding in fish. Its fruit-trees are celebrated over all Slesvig. The Gravenstein apple, in particular, forms an important article of commerce. The chief towns are Sonderborg or Südborg (South Town), and Norborg or Nordborg (North Town). The former has an excellent harbor, with a population of abt. 5000. Close to the harbor are the ruins of an old and famous castle belonging to the Augustenborg family. Here Christian II., of Denmark and Norway, was confined from 1532 to 1549. In the war of 1864, A. was taken by the Prussians from the Danes.

AL'STED, JOHANN HEINRICH, 1588-1638; a German Protestant divine and voluminous writer, professor of philosophy and divinity at Weissenburg. His *Encyclopædia*, *Thesaurus Chronologicæ*, and *De Mille Annis*, are well known. The latter was a prophecy that the thousand years, or millennium, during which the saints were to reign on the earth, would commence in 1694.

AL'STEB, a river in Holstein, is formed by the confluence of three streams, and, in the neighborhood of Hamburg, spreads itself out, and forms a lake, called the Great or Outer A., and, within the t., the Inner A. It flows by several canals into the Elbe.

ALSTON, JOHN, d. 1846; a Glasgow merchant who introduced books printed in raised letters for the blind. He published the Bible in such letters, and more than 20 volumes of other works, besides maps and charts.

ALSTRÖMER, or **ALSTRÖMER**, **JONAS**, 1685-1761; a Swedish industrial reformer. He was a clerk and a shipbroker in London, and undertook to introduce English industries in his native country, where he established a woolen factory, a sugar refinery, and improvements in farming, in ship-building, tanning, etc. His best success was in bringing sheep from England, Angora, and Spain. High honors were given him; he was made a noble, with permission to change his name to Alströmer, and there is a statue of him in the Stockholm exchange.

ALSTRÖMER, or **ALSTRÖMER**, **KLAS**, 1736-96; son of Jonas; a botanist, having for his master and friend, Linnæus, who named in his honor the genus *Alströmeria*. He visited Spain and wrote a work on the breeding of fine-wooled sheep.

ALSTRÖMERIA or **ALSTRÖMER'S LILY**, a genus of plants of the natural order *Amaryllidæ* (q.v.), and, according to Lindley, of the tribe *Alströmeriæ*, which is distinguished by fibrous—not bulbous—roots, and by having the outer segments of the perianth different in form from the inner. In this genus, the two lower segments are somewhat tubular at the base, the capsules do not gape when ripe, are 3-valved or pulpy within, and the seeds globose. The leaves are twisted, so that what should be the upper surface, becomes the lower. The species are numerous, natives of the warmer parts of America. Many of them have tuberous roots. Some are sufficiently hardy to endure the open air in Britain, and are admired ornaments of our flower-gardens. Some have climbing or twining stems; amongst these is the *salsilla* (*A. salsilla*), a plant of great beauty, with lanceolate leaves, a native of Peru, which is cultivated in the West Indies, and its tubers eaten like those of the potato. In Britain, it requires the stove or a hot-bed. *A. ovata*, also a beautiful plant, with a slender twining stem, and ovate leaves, is cultivated in Chili for its tubers, which are used as food. It has been introduced into Britain, but its cultivation has made little progress. The tubers weigh from 3 to 6 ounces. A kind of arrow-root is also prepared in Chili from the succulent roots of *A. pallida* and other species.

ALT, or **ALTEN** (Ger. "old"), a prefix to many names in Europe as "alt-dorf," "old village," or "old town."

ALTAI (*A. Yeen Oola*) is the term vaguely applied to the high range in the e. of Asia, forming the northern border of that vast table-land known by the name of Chinese Tartary, and extending from 80° to 142° e. long. The *A.* mountains constitute the boundary between the Russian and Chinese empires, or between the long icy lowlands of Siberia, stretching away to the Arctic sea, and the variegated central plateau that lies s. of them. Their general direction is from e. to w. They are divided into many ranges and groups, each having a distinctive name. From the sea of Okhotsk, in the extreme e. of Asia, they extend in a broad and winding mass to the plains of Turkestan, a little to the w. of lake Zaisan, or Zaizang, a distance of more than 3000 m. The breadth of the system is, in some places, not less than 800 to 900 m. From Okhotsk to the Lena, it is called the Aldan chain; it is next separated into three groups by the valleys of the Amur, Yenisei, and Irtysh, the last of which is called the little *A.*, to distinguish it from the spur that strikes off into Chinese Tartary in a south-easterly direction, which is called the great *A.*, a range that in some places towers into the region of perpetual snow, and whose most easterly cliffs abruptly disappear in the dark clouds which overhang the sandy steppes of Gobi. The Russian *A.*, between Semipalatinsk and the sources of the Obi, have been colonized by the Russians, and as they rival the Ural mountains in their mineral wealth, they have already become one of the most important districts of the Russian empire. This chain consists of a broad Alpine range on the north-western edge of Chinese Tartary, and is called the Altai-Bjelki, or Snowy mountains. It reaches in its highest peaks an elevation of nearly 11,000 ft. Little is known of the geology of the Altaian system. Jasper is found in considerable abundance near the summits, red porphyry lower down, and granite still lower. Around lake Baikal there are numerous granitic masses, interspersed with newer igneous formations, but active volcanoes do not appear until the range reaches Kamtchatka. The mines are rich in gold, silver, copper, and lead. The botany of the mountains is as imperfectly known as the geology, but it seems to be worthy of closer attention. N. of the *A.*-Bjelki lies the broad zone of the *A.* mineral districts, the inhabitants of which are employed as miners and agricultural laborers, over whom a strict watch is kept. The s.e. is peopled by the Calmucks of the mountains, a Mongolian race. They are heathens, and their government is a patriarchal one. They lead a nomadic life, encamping in summer among the rich pastures on the mountain-terraces, and in winter within the sheltered recesses of the woody glens.

ALTAI MOUNTAINS. Since the article **ALTAI** was originally written, the explorations of Russian surveyors have led to a more definite knowledge of the form and limits of this important range, now described as a separate system, one of the four parallel chains which constitute the skeleton of eastern high Asia, covering the great table-land. The *A.* forms an alpine girdle, intersected by wide valleys traversed by many streams.

among which are the Tez river, flowing w. to the Ubsa Nor (lake), and the Kobdo, flowing s. to the Tke Aral lake. The general direction of the range is from w. to e., about the parallel of 50° n. It extends between the meridians of 84° and 100° e. On the e. the A. is separated from the Daurian mountain-system by lakes Kosgol and Baikal; on the w. it terminates in the Katunsk mountains, a small isolated group, in which Mt. Beluka rises to 12,790 ft., far above the line of perennial snow, with extensive glaciers on its western flanks. The climate of the A. is not so severe as might be inferred from its position. The winters are frequently mild, and comparatively little snow falls. The mountain slopes are covered with rich grass, and their flanks are in many parts adorned by magnificent cedar forests. Stags, hares, and wolves abound in the lower, and bears in the higher portions of the range. The A. is celebrated for its gold, silver, and lead mines. Barnaul, on the northern slope of the range, is the chief mining town; and the village of Zeminogorski, s. of Barnaul, is in the center of the richest silver mines in the Russian empire. N. of the Ubsa Nor (lake), the Tangnu Ula mountains, connected with the A. on the n., rise to upwards of 11,000 ft. They furnish abundance of white marble of an excellent quality.

ALTAMURA, a t. of s. Italy, in the province of Bari, and 28 m. s.w. from Bari, at the eastern base of the Apennines. It is a well-built and beautiful t., surrounded with walls, and having a magnificent cathedral. The surrounding country is fertile, produces much oil and wine, and abounds in rich pastures. A. is supposed to occupy the site of the ancient *Lupazia*. Many fine Grecian antiquities have been dug up. Pop. abt. 18,000.

ALTAR (Lat. *altare*, from *altus*, high), the place whereon offerings were laid both by Jews and heathens. The first on record is that which Noah built on leaving the ark. The Israelites, after the giving of the Law, were commanded to make one. We find, from the Old Testament (1 Kings iii. 3; 1 Kings xi. 7; and 2 Kings xxiii. 15), that altars were often erected on high places—sometimes, also, on the roofs of houses. Both in the Jewish tabernacle and temple there were two altars, one for sacrifices, and another for incense. For a minute description of these, see Exodus, Leviticus, and Numbers. The Jewish and oriental altars were generally either square, oblong, or approximating to such; those of Greece and Rome, on the other hand, were often round. Sacrifices were offered to the infernal gods, not on altars, but in cavities dug in the ground.

The word has been transferred into the Christian system. For upwards of five centuries, altars in the Christian churches were, for the most part, made of wood; but in 509 A.D., it was decreed by a council held at Epone, in France, that none should be consecrated with chrism except those built of stone. In the first ages of Christianity, there was only one A. in a church; but, from a very early time, the Latins have used more than one. In the 12th c., the adorning of churches with images and numerous altars was carried to a great extent, and they were embellished with gold, silver, and precious stones. The Greek church use but one A. Altars were frequently placed at the w. end of the ancient churches, instead of the e., but in England almost uniformly in the e. The only perfect A. of the old times in England is the high A. of Arundel church, Sussex. The slab is 12 ft. 6 in. long, by 4 ft. wide, and 2½ in. thick. The support is of solid stone, quite plain, and plastered over. For 300 years after the time of Christ, the word A. was constantly used to describe the table of the Lord; subsequently, "table" and "altar" were used indifferently. In the first prayer-book of king Edward, 1549, the word A. was used in the rubric, and the Lord's supper was still called the Mass; but in 1550, an order was issued for the setting up of tables instead of altars, and in the second prayer-book, of 1552, the word *altar* was everywhere replaced by *table*. The table was further ordered to be of wood, and movable. In Mary's reign the altars were re-erected; but in Queen Elizabeth's, some were riotously pulled down, and injunctions were then issued directing that this should not be done, except under the oversight of the curate and at least one churchwarden. It was charged against archbishop Laud that he had converted communion-tables into altars. What he really did was to remove the tables out of the body of the church, and place them "altarwise," i.e., n. and s., at the upper end of the chancels, where the altars formerly stood; and a dog having on one occasion run away with a piece of the consecrated bread, he directed that rails should be erected to prevent such desecrations in future. The old stone altars used frequently to be made in the shape of tombs, and they inclosed relics; this was from the early Christians having often celebrated the eucharist at the tombs of the martyrs, or, as others say, they were thus made with the design of representing Christ's humanity as having been real, and vouched for by the fact of his body lying in the tomb. The Credence Table and Piscina are adjuncts of an A. By the judgment in the Arches court, 1845, in the case of *Faulkner v. Litchfield*, it was decided that altars may not be erected in churches. This case arose out of the erection, by the Cambridge Camden society, of a stone A. in the church of the Holy Sepulchre in that town.

The old English divines, and, indeed, all Protestant ecclesiastical writers of any importance, are unanimous in the opinion that among Christians the word cannot mean what the Jews and heathens expressed by it. The later fathers used various phrases to denote the solemnity which should attach to the communion-table, such as "the mystical and tremendous table," "the mystical table," "the holy table," etc. And they termed it an A., because, *first*, the holy eucharist was regarded as a kind of com-

memorative sacrifice, or, more properly, a consecrated memorial before God of the great sacrifice on Calvary; and, *second*, the prayers of the communicants were held to be in themselves sacrifices or oblations—sacrifices of thanksgiving, as it were. This is the view of those who hold high church opinions, but does not exclude the other view. Again, they termed it a *table* when the eucharist was considered exclusively in the light of a sacrament, to be partaken of by believers as spiritual food. In the former case, the sacrifice was commemorated; in the latter, it was applied: in the former, it expressed more directly the gratitude; in the latter, more directly the faith of the Christian.

ALT-DORF. See **ALTORF**.

ALT DORFER, ALBRECHT, painter and engraver, was b. at Altdorf, Bavaria, abt. 1480, and d. at Ratisbon, 1538. He is said to have been a pupil of Albert Dürer; but this is not certain. He belongs, however, to that religious school of artists of which Dürer was the head. His pictures are also animated by a glowing and romantic spirit of poetry which is delightful to any one who appreciates the conditions of old German life. The landscape is delineated with the same truth and tenderness as the figures; a rich manifold life pervades the scenes, and everything is handled with the utmost delicacy. His master-piece, now in Munich, is "The Victory of Alexander over Darius," a painting which, it is said, affects the beholder like a heroic poem. As an engraver, A. is reckoned among the lesser masters.

ALTEA, a seaport t. of Valencia, Spain, in the province of Alicante, and 25 m. n.e. from Alicante. It stands on a rising ground, on the right bank of a small river called the Alga, and at the head of a bay. It has wide streets, but many of them are steep. The inhabitants are mostly engaged in agriculture; some of them are fishers and sailors. Linen fabrics, ropes, and soap are manufactured. Pop. 6000.

ALTEN, KARL AUGUST, Count of, one of the chief Hanoverian generals in the Napoleonic wars, was b. Oct. 20, 1764; entered the army in 1781, and gained distinction at the siege of Valenciennes, and in the decisive engagement at Hondschooten. He was first lieut. in 1800, but on account of the unhappy capitulation at Lauenburg, found it advisable to leave Hanover, and came to England. Here he was made commander of the first light battalion in the German legion (1803). In 1808, he assisted as general of brigade in covering the retreat of Gen. Moore to Corunna, and in the following year commanded the troops stationed in Sussex. In 1811, he took part, under Gen. Beresford, in the siege of Badajoz and the battle of Albuera, and in the following year was promoted by the duke of Wellington. In almost all the engagements of the Spanish war of liberation—at Salamanca, Vittoria, the Pyrenees, Nivelle, Nive, Orthez, Toulouse, etc., A. took a prominent part, and had the command of a corps of 30,000 men, stationed near Madrid, in 1812. He fought with great distinction at Quatre-Bras and at Waterloo, where he was severely wounded; his efforts greatly contributed to the decision of the battle. After his return to Hanover he was made minister of war, and in this capacity d., April 20, 1840.

AL TENA, a t. of Westphalia, Prussia, in the government of Arnsberg, 40 m. n.e. from Cologne. It stands on the right bank of the Lenne, in a deep and picturesque valley. It has large public works, the machinery of which is moved by water-power, and manufactures great quantities of needles, pins, and other small articles of hardware. There are also stocking manufactories and tanneries. Pop. 10,500.

ALTENBURG, the capital of the duchy of Saxe-Altenburg, is situated in a fertile country about 24 m. from Leipsic, and contains (1890) 81,440 inhabitants. Standing on an almost perpendicular rock of porphyry, the old castle of A. forms a striking feature in the landscape. Its foundations are probably as old as the 11th century. A. possesses several excellent educational institutions, a museum, and a theater. Brushes, gloves, and cigars are among the chief manufactures carried on in A., and the book trade is considerable. A railway connects it with Leipsic and Bavaria.

ALTENESSEN, a t. in Prussia, in the Rhine province; pop. 12,300.

ALT TENGGAARD, or **ALTEN**, a seaport t. in the province of Finmarken, Norway, situated at the mouth of the river Alten, in lat. 69° 55' n., and long. 23° 4' e. Beyond this point no cultivation is attempted; and even here potatoes and barley alone are produced. A. has a harbor and considerable trade. It is visited principally by Russian and Norwegian vessels. Pop. about 2000.

ALTEN-ÖT TING, or **ALTÖT TING**, a place of pilgrimage not far from the Inn, is situated in one of the most beautiful and fertile plains of upper Bavaria. It is frequented by thousands of Roman Catholics from Austria, Bavaria, and Swabia, on account of a famous image of the Virgin Mary (the "Black Virgin") which it possesses, and may be called the Loretto of Germany. It has also an extraordinarily rich treasure of gold, silver, and precious stones. From 1838 till their expulsion in 1873, A. was the headquarters for Germany of the redeмпtorist fathers. There is also a capuchin monastery here. A. was originally a *villa regia*. Several German emperors, such as Henry III. and Henry IV., held their court here. The emperor Leopold I., and other princes of the house of Hapsburg, made pilgrimages to it. A chapel, called Tilly's or Peter's chapel, contains

the tomb of count Tilly, who was buried here at his own request. Maximilian I. and numerous other princes and princesses of the Bavarian family have had their hearts interred in it. Pop. about 3200.

ALTENSTEIN, a castle near Eisenach, Saxe Meiningen, on the s. slope of the Thuringer wald, the summer residence of the governing dukes. It has a fine park in which is a cavern 500 ft. long through which flows a large stream. Boniface lived and preached here in 724; and near by is the place where, in 1521, Luther was seized to be carried off to Wartburg.

ALT'ENSTEIN, KARL VON, Baron, 1770-1840; a Prussian statesman. After the treaty of Tilsit he became the head of the finance department; in 1815, he went to Paris with Humboldt to claim the restoration of works of art taken from Prussia by the French armies; afterwards he was minister of public worship and education, doing great service for the universities and schools. Under his direction the university of Bonn was founded. He was one of Fichte's warm supporters.

ALTERATIVES, in medicine, a term applied to remedies that have the power of changing the state of the living solids of the body, and consequently altering the functions which they perform. It is generally applied, however, to medicines which are irritant in full doses, but which almost imperceptibly alter disordered actions or secretions; acting specially on certain glands, or upon absorption in general, when they are given in comparatively small doses, the treatment being continued for a considerable length of time. For example, mercury is an irritant in some of its preparations; but when small doses of blue pill, Plummer's pill, or corrosive sublimate are given at intervals for some length of time, they "produce *alteration* in *disordered* actions, so as to cause an improvement in the nutrient and digestive functions, the disappearance of eruptions, and the removal of thickening of the skin or of other tissues" (Royle); and they will effect these changes without otherwise affecting the constitution or inducing salivation. So iodine, also an irritant in concentrated doses, and poisonous in some forms, is most useful, when given in small doses, in effecting the removal of enlarged glandular organs, and need not cause iodism, if carefully given.

The preparations of gold are likewise stimulants of the absorbents, and are used in cases of scrofula. Some preparations of arsenic are powerful A. in cases of skin-disease. So also are the decoctions of the *woods* and their substitutes, such as decoction of sarsaparilla, and the like, which, when taken in large quantities of water, must operate partly by their diluting and solvent properties, and partly by the stimulant effect of the active principles of several ingredients in these diet-drinks, conveyed into the capillaries.

ALTER'NATE, in botany. See LEAVES.

ALTER'NATE GENERATION (see GENERATIONS, ALTERNATION OF): a method of reproduction, in which the young resemble not the parent but the grandparent or some more remote ancestor, the successive generations passing through a regularly recurring series. The radiated creatures, popularly called jelly-fishes, illustrate A. G. In pools left at low tide on the sea-shore, a hydroid is found growing in tufts like shrubs, each individual pendent from the general mass by a slender tube, as a flower from its stem, each mouth taking food for the common nourishment. The young of this creature are jelly-fishes, small, transparent cups, from which depend four long threads and a proboscis, each specimen an independent unit moving freely in the water. This creature produces bunches of spheres from which come other jelly-fishes, and also spheres or eggs from which are developed pear-shaped bodies, that take a permanent abode and have the form of the first hydroid. The fixed hydroids and swimming jelly-fishes are alternate forms assumed by the successive generations of the same animal.

ALTHE'A. See MARSH MALLOWS and HOLLYHOCK.

ALT'HEN, E'HAN, or JEAN, 1711-74; b. in Persia, and a slave to a planter, from whom he escaped and went to Avignon, where he established the cultivation of madder. Like many others who have conferred great benefits on the public, he died in extreme poverty.

ALTHORP, LORD. See SPENCER.

ALTHORN, an instrument standing in E-flat or F, used in military music. Owing to its upright bell, it is easily played on horseback, and often replaces the French horn. It belongs to the Saxhorn family, and the name is sometimes given to the Saxhorn in B-flat. See HORN.

ALTIMETRY (Lat., *altus*, high, *metrum*, measure), the art of ascertaining altitudes by means of an *altimeter*, which is any instrument for taking altitudes, as a quadrant, sextant, or theodolite (q. v.).

ALTIN', a lake in Siberia, which is one of the sources of the Obi, in the Altai mountains, 320 m. s. of Temsk; 80 m. long by 50 wide. This lake is remarkable because in winter the northern part is frozen so as to bear sledges while the southern part has never been known to freeze.

ALTITUDE, in astronomy, is the height of a heavenly body above the horizon. It is measured, not by linear distance, but by the angle which a line drawn from the eye to the heavenly body makes with the horizontal line, or by the arc of a vertical circle intercepted between the body and the horizon. Altitudes are taken in observatories by means of a telescope attached to a graduated circle (see CIRCLE), which is fixed vertically. The telescope being directed towards the body to be observed, the angle which it makes with

the horizon is read off the graduated circle. The A. thus observed must receive various corrections—the chief being for parallax (q.v.) and refraction (q.v.)—in order to get the true A. At sea, the A. is taken by means of a sextant (q.v.), and then it has further to be corrected for the dip of the visible horizon below the true horizon (see HORIZON). The correct determination of altitudes is of great importance in most of the problems of astronomy and navigation. See LATITUDE.—An ALTITUDE and AZIMUTH INSTRUMENT consists essentially of a vertical circle with its telescope so arranged as to be capable of being turned round horizontally to any point of the compass. It thus differs from a transit instrument (q.v.), which is fixed in the meridian. See AZIMUTH.

ALT KIRCH, a t. in upper Alsace, 70 m. s. of Strasbourg; pop. about 4000; selected by Germany to be fortified as a counterpoise to Belfort in France. A. was founded in the 12th c., and has the ruins of a castle which was often occupied by Austrian archdukes in their visits to Alsace.

ALTMARK, an old district in Germany which formed the nucleus of the electorate of Brandenburg. From 1807 to 1813 it belonged to the kingdom of Westphalia. After the year 1815 it formed a part of the administrative district of Magdeburg, its chief city being Stendal. Its pop. is estimated at 195,000.

ALTMÜHL, a river in Bavaria, an affluent of the Danube which it joins at Kelheim near Ratisbon. The Ludwigs Canal connects it with the Main system. Length about 125 miles.

AL TO (*contralto deciso*) is the deepest or lowest species of musical voice in boys, in eunuchs, and best of all in females, where its beauty of tone gives it the preference. This quality of the human voice has been too much neglected by modern composers and singing-masters. The powers of expression which it possesses are quite peculiar, and cannot be supplied by any other kind of voice. Its tone-character (timbre) is serious, spiritual, tender, and romantic. The low A. in particular has a fullness of tone combined with power in the lower range. No other voice expresses so decidedly dignity, greatness, and religious resignation: it can also represent youthful manly power as well as romantic heroism. The high A. has generally the same range of compass as the mezzo-soprano, but differs from it in the position of the cantabile and in its character of tone. A. voices generally consist of two registers, the lowest beginning at F or G below middle C, and reaching as high as the A or B above the octave C. The higher notes up to the next F or G partake more of the character of the soprano. See VOICE.

ALTON, a t. of Hampshire, England, of considerable antiquity, near the Wey, 16 m. n. e. from Winchester. It is pleasantly situated among picturesque hills and woods. The principal street forms part of the main road from London to Winchester. The church was erected in the reign of Henry VII., and is in the perpendicular style.

ALTON, city of Madison co., Ill., on a bluff 200 feet high on the left bank of the Mississippi river, which is spanned here by a great railroad bridge; twenty-four miles above St. Louis. It is on the Chicago and Alton and other railroads, is the centre of a large commerce, and has woolen and glass factories, flouring-mills, machine shops, brick yards, powder works, farming implement factories, etc. It has many churches, a Roman Catholic cathedral, and contains a monument to Elijah P. Lovejoy (q. v.). Population 1890, 10,294.

AL'TON, JOS. WILHELM EDUARD D', professor of archaeology and the history of art at Bonn, was b. 1772, at Aquileia, and d. in 1840. In early years his attention was directed to natural history, especially that of the horse, on which he published a splendid illustrated work (*Naturgeschichte des Pferdes*, Bonn, 1810), which was completed in 1817. In concert with his friend Pander, he projected an extensive work on comparative osteology, of which the first division was published at Bonn, 1821–1828. His etchings of animals, etc., are esteemed as valuable. Albert, the late prince consort of queen Victoria, was a pupil of A. in the history of art.

AL'TONA, the largest and richest city in the Prussian province of Slesvig-Holstein, is situated on the Elbe, so near Hamburg that the two cities are only divided by the state boundaries. Pop. '95, 148,944. A. lies higher than Hamburg, and is much healthier; but, on the other hand, it is destitute of the numerous canals so necessary for the transport of goods, with which Hamburg is so abundantly provided. In a commercial point of view, it forms one city with Hamburg. Its trade extends to England, France, the Mediterranean sea, and the West Indies. There are many important industrial establishments in A.; among others, the manufacture of tobacco, cotton, woolen, chemicals, soap, leather, ropes, etc. A. is a free port, and enjoys many privileges in respect of trade, and also of civil freedom; all sects are allowed the free exercise of their religion. The city is connected by a railway with Kiel, Rendsburg, and Glückstadt. The observatory, which gained a great reputation under the direction of its founder, Schumacher, who died in 1851, was transferred to Kiel in 1874. The rise of A. to its present importance has been recent and rapid for a continental town.

ALTOONA, city of Blair county, Penn., at the eastern base of the Alleghany mountains, 1180 feet above the sea level, on the Pennsylvania railroad, 237 miles west of Philadelphia and 117 east of Pittsburgh. The railroad crosses the mountains at this point, and during the ascent two locomotives are required to move the train. The magnificent view which gradually opens to the vision of the traveler can scarcely be imagined.

Besides large machine shops there are the car-works and locomotive-shops of the Pennsylvania railroad, extensive planing-mills, and over 200 other manufacturing establishments. The hydraulic works cost \$500,000. There are churches, convents, hospitals, public schools, a public library, banks, and an electric street railway. The large number of daily and weekly newspapers show the literary taste of the people. Population in 1890, 30,337.

ALTOONA or **ALLATOONA PASS**. A pass in the vicinity of the town of Allatoona, in northwestern Georgia. Here occurred, during the late Civil War, on Oct. 5, 1864, the battle made memorable by the gallant defense of Allatoona by Gen. John M. Corse, of the Federal Army. Gen. Sherman was occupying Atlanta, having garrisoned Allatoona as his second base; this point the confederates determined to capture, and Gen. S. G. French, under Gen. Hood, was commissioned to accomplish the work. Sherman, being informed of these designs, signaled from Kenesaw Mountain to Gen. Corse, stationed at Rome, to move with the utmost speed to Allatoona and hold it against all opposition until he himself could arrive with aid. Here Gen. Corse, with scarcely 2000 men, maintained the defense from nine o'clock in the morning until three o'clock in the afternoon against a large force of confederate soldiers. At three o'clock, Gen. French sounded a retreat, and Allatoona was saved. Gen. Sherman at once took as the subject of a general command the principle of war illustrated here, that fortified posts should be defended to the last, regardless of the relative numbers of the party attacked or attacking.

ALTORF, the chief t. in the Swiss canton Uri, is situated in a sheltered spot at the base of the Grunberg, about 2 m. from the head of the lake of the Four Cantons, and contains abt. 3000 inhabitants. It is a well-built town, having several open places, a church, a nunnery, and the oldest capuchin monastery in Switzerland. The little tower on which the exploits of William Tell are painted in rude frescoes, is known to be older than the legend of Tell. The lime-tree under which the scene of the shooting of the apple was laid, was removed in 1567, and a stone fountain erected in its stead.

AL'TO-RILIEVO (Ital.), high-relief, the term used in sculpture to designate that mode of representing objects by which they are made to project strongly and boldly from the background, without being entirely detached. In A. R., some portions of the figures usually stand quite free, and in this respect it differs not only from *basso-rilievo*, or low-relief, but from the intermediate kind of relief known as *mezzo-rilievo*, in which the figures are fully rounded, but where there are no detached portions. In order to be in high-relief, objects ought actually to project somewhat more than half their thickness, no conventional means being employed in this style to give them apparent prominence. In bass-relief, on the other hand, the figures are usually flattened; but means are adopted to prevent the projection from appearing to the eye to be less than half; because if an object projects less than half, or, to state it otherwise, be more than half buried in the background, it is obvious that its true outline or profile cannot be represented. This rule, that in all reliefs there shall be either a real or an apparent projection of at least half the thickness of round objects, was strictly observed in the best period of Greek art, but it has been often neglected in the execution of reliefs in later times, and hence attempts have been made at foreshortening and perspective, which have necessarily resulted in partial failure.

Relief forms a kind of intermediate stage between plastic art and painting, the mode of representation being borrowed from the former, whilst the mode of arrangement to a certain extent, is in accordance with the latter. The plastic principle occupies the most prominent place in the simple and tranquil reliefs of the earlier art of Greece, whereas the pictorial principle preponderates in the crowded and often excited scenes represented in the later Roman reliefs. In such reliefs as have been produced in modern times, the one element or the other has prevailed, according as the one model or the other has been followed. The works which have been recovered from the ruins of Persepolis, Nineveh, and Babylon, still attest the extensive employment of relief in Persian and Assyrian art. Of the latter, which usually belongs to the class of *mezzo-rilievo*, some of the finest specimens in existence are now to be seen in the British museum. Though never exhibiting the life and freedom of classical or modern European art, the elaborately executed and majestic reliefs of these semi-oriental nations are greatly in advance not only of the whimsical distortions of nature exhibited by the Hindoos, but of the inanimate and motionless representations of the Egyptians.

The earliest Greek reliefs possessed a hard and severe character, somewhat approaching to the art of those earlier nations of which we have just spoken, and were very slightly raised. Of this we have an example in the two lions over the gate at Mycenæ—probably the oldest Greek relief in existence. It was Phidias who gave to relief its true character, and finally brought it to a degree of perfection which it has never since attained. The *alti-rilievi* which adorned the metopes of the parthenon at Athens, and the temple of Apollo at Phigalia in Arcadia, now preserved in the British museum, are still not only unsurpassed, but unapproached as examples of the style. In none of these do we see any attempt at perspective, and even foreshortening for the most part is avoided.

Under the Romans, sculpture was employed to an enormous extent in the decoration of tombs and sarcophagi, whole streets of such monuments being constructed, as, for example, on the Appian way. The result of the demand thus created was that sculpture became a manufacture rather than an art, and attempts were made to supply by

technical execution and mere mass what had been lost in thought and spirit. Relief was now applied, often by Greek artists resident in Italy, to purposes for which the Greeks, in their own land and in their better times, had rightly conceived it to be unsuited. Behind figures standing nearly free a second rank was introduced, and those numerous examples of a false style, still to be found in every gallery in Europe, were produced, the imitation of which afterwards led to such a lavish expenditure of artistic talent in Italy. The attempt which the Romans had made to invade the province of painting, by means of sculpture, was carried still further by the Florentine artists of the 16th and 17th centuries. Not only were several rows of figures represented in perspective, but even landscape was introduced with a success which, in the hands of such artists as Ghiberti, was positively marvelous. If the highest perfection in the true plastic style of relief was attained by Phidias in the metopes of the parthenon at Athens, a corresponding merit may be claimed as regards the degenerate pictorial style by Ghiberti in the celebrated bronze doors of the baptistery of San Giovanni at Florence. Even Canova's reliefs partook to far too great an extent of the character of paintings in stone; and to Flaxman, and above all to Thorwaldsen, must be assigned the merit of restoring this style of art to its genuine and original principles. It is to be remembered, in studying the reliefs of classical times, that studiously as the Greeks avoided a pictorial conception of their subject, they did not eschew the use of color where it could be employed to heighten the effect of their reliefs. There is reason to believe that in many excellent examples the background was painted blue, and that the hems of the garments of the figures, and the like, were often colored or gilded.

ALTRINGHAM, a market-t. of Cheshire, England, on Bowden downs, 8 m. s.w. from Manchester. It is situated on the Cheshire Midland railway, and near the duke of Bridgewater's canal, which has contributed greatly to its prosperity. It is a very neat and clean t., and on account of the salubrity of the air, is much resorted to by invalids from Manchester. It has manufactures of artificial manures, and an iron-foundry, but a chief employment of its inhabitants is the raising of fruits and vegetables for the market of Manchester. Pop. '91, 37,988.

ALTRO VOLTO (Italian), another turn, a word used in the early part of the last century for encore.

ALTRUISM (Latin, *alter*, another), a word introduced by the Positivists, followers of the French philosopher Comte, as the opposite of *egoism* or selfishness. It signifies a love for others and a due regard for their feelings and interests. Altruism is regarded by Positivists as the crowning virtue of their system, in the exercise of which the perfected individual will find not only his duty but his chief pleasure. We die, they say, but our actions live after us, and bear fruit to the most distant ages. The consciousness of this survival of the results of our actions must be a constant incentive to righteousness; and the consolation of knowing that his life has been a useful one to the race is offered to the just man as the only substitute for the Christian's hope of immortality. This doctrine has been eloquently phrased by George Eliot, in her later years the greatest of all the Positivists, in her lines beginning, "O may I join the choir invisible!" But the average man may find little comfort or incentive to duty in thinking that after he is annihilated he will have smoothed the pathway of other men in their progress to a similar annihilation—a view entertainingly presented by Mallock in *Is Life worth Living?*

ALTURAS, a former co. in s. Idaho, on Snake River; area, 6700 sq. m.; pop. '90, 2629. In 1895 both Alturas and Logan counties were abolished, and the county of Blaine was created therefrom.

ALUM, a whitish, astringent, saline substance; properly it is a double salt, being composed of sulphate of potash and sulphate of alumina, which, along with a certain proportion of water, crystallize together in octahedrons or in cubes. Its formula is $K_2SO_4 \cdot Al_2(SO_4)_3 + 24H_2O$. A. is soluble in 18 times its weight of cold water, and in its own weight of hot water. The solution thus obtained has a peculiar astringent taste, and is strongly acid to colored test papers. When heated, the crystals melt in their water of crystallization; and when the water is completely driven off by heat, there is left a spongy white mass, called burnt A. or anhydrous A. A. is much used as a mordant in dyeing. This property it owes to the alumina in it, which has a strong attachment for textile tissues, and also for coloring matters; the alumina thus becomes the means of fixing the color in the cloth. The manufacture of the colors or paints called lakes depends on this property of alumina to attach to itself certain coloring matters. Thus, if a solution of A. is colored with cochineal or madder, and ammonia or carbonate of soda is added, the alumina of the A. is precipitated with the color attached to it, and the liquid is left colorless. Alumina, the basis of pure clay—which is a silicate of alumina—derives its name from being first extracted from A. A. is also used in the preparation of leather from skins, and, in medicine, as a powerful astringent for arresting bleeding and mucous discharges. Its use in the making of bread, to give a white appearance and more pleasing consistence to bread made from indifferent flour, is highly objectionable. A. rarely occurs in nature, except in a few springs and in some extinct volcanoes, where it appears to be formed from the action of sulphurous acid vapors upon felspathic rocks. In Gt. Britain, it is prepared artificially from A.-shale, obtained from coal-mines at Hurlett and Campsie, near Glasgow; and A.-slate, which occurs at Whitby, in Yorkshire, and

there forms precipitous cliffs, extending about 30 m. along the e. coast of England. The A.-slate, shale, or schist, consists mainly of clay (silicate of alumina), iron pyrites (bisulphuret of iron), and coaly or bituminous matter. When the shale is exposed to the air—as it is in the old *coal-wastes* or mines from which the coal has been extracted—the oxygen of the air, assisted by moisture, effects a decided change upon it. The original hard stony substance begins to split up into thin leaves, and becomes studded over and interspersed with crystals. The latter are the result of the oxidation of the sulphur of the pyrites into sulphuric acid, and the iron into oxide of iron, both of which in part combine to form sulphate of iron, whilst the excess of the sulphuric acid unites with the alumina of the clay, and produces sulphate of alumina. When the A.-shale thus weathered is digested in water, there dissolve out the sulphate of alumina, $\text{Al}_2(\text{SO}_4)_3$, and sulphate of iron, FeSO_4 ; this solution is treated with chloride of potassium, KCl, which decomposes the sulphate of iron, forming sulphate of potash, K_2SO_4 , and proto-chloride of iron, FeCl_2 . When this liquid is evaporated to concentration, and allowed to cool, crystals of A., leaving the composition above described, separate out, and the chloride of iron is left in the solution or *mother-liquor*. The crystals of A. obtained from the first crystallization are not free from iron, and hence require to be redissolved in water, reconcentrated, and recrystallized. This operation is generally repeated a third time before the A. is obtained pure.—As the preliminary weathering of the shale takes some years to proceed, a more expeditious method is now largely resorted to. The shale is broken in fragments, and piled up over brushwood in long ridges, shaped like hugh potato-pits, and the brushwood being set fire to, the coaly matter of the shale begins to burn, and the whole ridge undergoes the process of roasting; the results of which are the same as those of the weathering operation—namely, the oxidation of the sulphur and iron, and the formation of sulphate of alumina and sulphate of iron. This material is afterwards worked up as previously described. The roasting operation is so much more expeditious than the weathering process, that months suffice for years. The A. made at Tolfa, near Civita Vecchia, is extracted from A.-stone, a mineral containing sulphate of potash and sulphate of alumina, but united in such a form as to render them insoluble. When the mineral is calcined, the sulphates become soluble, and are extracted by lixiviation. The A. thus manufactured crystallizes in opaque cubes, having a reddish tint, due to the presence of iron, and goes by the name of *Roman alum*. The potash in A. can be replaced partly or altogether by soda or ammonia; the alumina by oxide of chromium or sesquioxide of manganese; or the sulphuric acid by chromic acid, or peroxide of iron, without altering the form of the crystals. There are thus soda, ammonia, chrome, etc., alums, forming a genus of salts of which common A. is only one of the species. The more important members of the class, expressed in symbols, are:

$\text{K}_2\text{SO}_4, \text{Al}_2(\text{SO}_4)_3, 24\text{H}_2\text{O}$, potash A.
 $\text{Na}_2\text{SO}_4, \text{Al}_2(\text{SO}_4)_3, 24\text{H}_2\text{O}$, soda A.
 $(\text{NH}_4)_2\text{SO}_4, \text{Al}_2(\text{SO}_4)_3, 24\text{H}_2\text{O}$, ammonia A.
 $\text{K}_2\text{SO}_4, \text{Cr}_2(\text{SO}_4)_3, 24\text{H}_2\text{O}$, chromic potash A.
 $\text{FeSO}_4, \text{Al}_2(\text{SO}_4)_3, 24\text{H}_2\text{O}$, iron A.

ALUMINA, the most abundant of the earths (q. v.), is the oxide of the metal aluminium (q. v.), the formula being Al_2O_3 . It occurs in nature abundantly in combination with silica, associated with other bases. The most familiar of its native compounds is felspar, a silicate of A., and potash, $\text{K}_2\text{O}, \text{Al}_2\text{O}_3, 6\text{SiO}_2$. This is one of the constituents of granite, and of several other igneous rocks. Certain varieties of these, by exposure to the atmosphere, become completely disintegrated, passing from the state of hard, solid rock, such as we are accustomed to see in building-granite, into soft, crumbling, earthy masses. It is the felspar which undergoes the change, and it appears to be owing to the action of rain-water charged with carbonic acid, which dissolves the potash and some of the silica of the felspar, leaving the excess of silica and the A. still united. Clay consists of silica and A. in a state of chemical combination. When it is pure, clay is quite white. More frequently, clay is red, owing to the presence of oxide of iron; or black, from the diffusion through it of vegetable matter.

From alum, A. is prepared by adding to a solution of the former, water of ammonia, as long as it occasions a precipitate. The A. appears as a voluminous, white, gelatinous substance, consisting of the oxide of the metal combined with water. When A. is precipitated from a solution containing coloring matter, such as logwood, etc., it carries down the color chemically united to the flocculent precipitate; in this way are formed the colored earths, called *lakes* (q. v.). A. in the state of precipitate, after being gently dried, is readily soluble in acids and in alkalis; but if heated to whiteness, it loses the associated water, contracts greatly in bulk, and forms a white, soft powder, not at all gritty, and with difficulty soluble in alkalis and acids. A., as generally prepared, whether hydrated or anhydrous, is insoluble in water, possesses no taste, and does not alter coloring matters; but some time ago Mr. Walter Crum obtained A. in an allotropic form, in which it is soluble in water. It is quite different, therefore, in properties from the alkaline earths, and is a much weaker base. In the anhydrous state it absorbs water with great readiness without combining with it, so that it adheres to the tongue, and is felt to parch it. A. is not fusible by a forge or furnace heat, but it melts before the oxyhydrogen blow-pipe into a clear globule, possessing great hardness. It occurs in nature in a similar state. The more coarsely crystallized specimens form the emery, the

transparent crystals, when of a blue color, owing to a trace of metallic oxide, constitute the precious gem the sapphire, and, when red, the ruby. A., in common with other sesquioxides, is a feeble base. The salts it forms with the acids have almost all a sour taste, and an acid action on colors.

ALUMINIUM — sym. Al. eq. (old) 13.7, (new) 27.02 — is one of the metals present in clay, granite, and other rocky and earthy substances. It was discovered by Wöhler in 1828, and was re-examined by him in 1846, when he obtained the metal in minute globules or beads, by heating a mixture of chloride of A. and sodium. In 1855, the French chemist Deville showed, as the result of a series of experiments, that A. could be prepared on a large scale and in a compact form without much difficulty. The mineral cryolite found in Greenland, which is a double fluoride of A. and sodium, was the ore first used for its manufacture; but bauxite, a mineral found in France, and consisting chiefly of alumina, or oxide of A. and oxide of iron, has more recently been employed as a convenient source of the metal. An aluminate of soda is first obtained by heating the bauxite with soda ash in a furnace, and separating it (the aluminate) from the insoluble portions by lixiviation. When carbonic acid is added to the solution, pure alumina is thrown down. The alumina is then formed into balls with common salt and charcoal, which are heated in an earthenware retort through which chlorine gas is passed. In this part of the process, the charcoal combines with the oxygen, and the chlorine with the A.; the latter sublimes over with the common salt (chloride of sodium), and is collected as a double chloride of A. and sodium. When this double chloride is heated in a reverberatory furnace with fluxes and metallic sodium, the latter seizes the chlorine combined with the A., which is then set free, and falls to the bottom ready to be cast into ingots for use.

The properties of A. are that it is a white metal, somewhat resembling silver, but possessing a bluish hue, which reminds one of zinc. It is very malleable and ductile, in tenacity it approaches iron, and it takes a high polish. When heated in a furnace, it fuses, and can then be cast in molds into ingots. Exposed to dry or moist air, it is unalterable, and does not oxidize as lead and zinc do. It melts at a comparatively low temperature, and neither cold nor hot water acts upon it. Sulphuretted hydrogen, the gas which so readily tarnishes the silver in households, forming a black film on the surface, does not act on A., which is found to preserve its appearance under all ordinary circumstances as perfectly as gold does. When fused and cast into molds, it is a soft metal like pure silver, and has a density of 2.56; but when hammered or rolled it becomes as hard as iron, and its density increases to 2.67. It is therefore a very light metal, being lighter than glass, and only one-fourth as heavy as silver. A. is very sonorous; and when a bar of it is struck, it gives out a very sweet, clear, ringing sound. It is a good conductor of heat and electricity. It is not more subject to corrosion by acids and alkalis than iron. It is not fire proof, however, and combustion reduces it to valueless alumina. The solder generally used consists of A., 6 per cent.; copper, 4 per cent.; and zinc, 90 per cent. A. forms, with copper, several light, very hard, white alloys; also a yellow alloy, which, though much lighter than gold, is very similar to it in color. This alloy contains from 5–10 per cent. of A. By itself, A. is used for jewelry, small works of art, and for optical, chemical, and surgical instruments. Its bluish color can be whitened by hydro-fluoric and phosphoric acids, and also by a heated solution of potash. An alloy of A. and tin is used for optical instruments, and from another of A. and silver, called "tiers argent," spoons and forks are made. An electrolytic method of reducing Al., which has resulted in cheapening this metal to a wonderful extent, was patented by Mr. Chas. M. Hall in the United States in 1889. The principle involved is the electric decomposition of alumina dissolved in a fused bath of the fluorides of Al. and other bases, the current reducing the dissolved alumina without affecting the solvent. The process has been operated by the Pittsburgh Reduction Co. since 1889, at which time they produced about 75 lbs. of Al. per day which they sold for \$4.50 per lb. In 1890 their capacity was increased to 400 lbs. per day, and the selling price reduced to \$2.00 per lb. In 1892 the works were enlarged to nearly one ton per day and the selling price has steadily decreased until it was about 50cts. per lb. in the year 1897. In 1895 the company built a very large plant at Niagara Falls, using the power generated by the new electric power plant. These works have a capacity of from 6000 to 8000 lbs. per day when in full operation.

Another important electrolytic process was patented in 1885 by E. H. & A. H. Cowles, the principle of whose process is that a powerful electric current is interrupted, the terminals being large carbon rods, and, the space between having been filled with a mixture of alumina, carbon and the metal to be alloyed, the intense heat generated in contact with this mixture causes the metal to melt and the alumina to be reduced to Al., which combines with the metal, while the oxygen escapes as carbonic oxide. This process is worked by the Cowles Electric Smelting and Aluminium Company, who operate a 1200 horse-power plant at Lockport, N. Y.; also by the Aluminium Brass and Bronze Company, of Bridgeport, Conn., who have an extensive plant for manufacturing Al. alloys.

ALUMNUS, originally indicating a student supported and educated at the expense of the "Alumnat," an institution endowed for educating youths who could not pay for living and tuition. Three such, founded by Maurice of Saxony, are still in active operation. But in modern usage every graduate of a college is an A.

ALUM ROOT. This name is given in the United States to two plants, very different from one another, but agreeing in the remarkable astringency of their roots. One of these, *geranium maculatum* (see GERANIUM), very much resembles some of

the species of geranium which are common weeds in Britain. The root contains more tannin than kino (q.v.) does. The tincture is of use in sore throat and ulcerations of the mouth, and is also administered in various diseases.—The property of astringency belongs, in an inferior degree, to some other species of *geranium*, and of the kindred genera, *erodium* and *pelargonium*.—The other American plant to which the name A. R. is given is *heuchera Americana*, of the natural order *saxifrageæ* (see SAXIFRAGE), an order in which also astringency is a prevalent property. The genus *heuchera* has the calyx 5-cleft, the petals undivided, five stamens, and the styles remarkably long. *H. Americana* is everywhere covered with a clammy down; the leaves are roundish, lobed, and toothed, the peduncles, dichotomous and straggling. The root is a powerful styptic, and is used to form a wash for wounds and obstinate ulcers.

ALUN NO, NICCOLO, or Niccolo of Fuligno, one of the old Umbrian painters, whose works first indicated the qualities discernible in that school. His earliest known piece is a "Madonna with Angels and Saints," 1458 A.D. There is also a gonfalon—a banner used in religious processions—of the year 1466, in the church of Santa Maria Nuova at Perugia, which A. painted for the brotherhood, as the inscription testifies: "*Societas Annunciantia fecit fieri hoc opus.*" It is a work of peculiar beauty, displaying deep religious feeling and exquisite sweetness. A. painted several of these gonfalons. Some of his pictures were carried off by the French, and sent to Paris; but at the restoration of artistic spoil, "The Nativity," "The Resurrection," etc., were returned, although "The Agony in the Garden" still remains in the Louvre. There is also a "Madonna between Two Angels," of the year 1499, to be seen in the parish church of the village of Bastia. Fragments, too, are still in existence of an altar-piece for the cathedral of Assisi. The picture represented a pieta, with two angels bearing torches, and, according to Vasari, weeping so naturally, that "no one," he thinks, "could have painted them better." A. is not so remarkable for the originality or fertility of his invention, as for his selection of details, warmth of feeling, purity, and devout faith. His earnestness, however, leads him at times into exaggeration.

ALURED, or **ALRED**, of Beverley, in Yorkshire, an old English historian of the time of Henry I. Little is known regarding him; but he is said to have been educated at Cambridge, and to have greatly distinguished himself by the variety of his learning. It is also stated that he had enriched his mind by travel, both in France and Italy, and that at Rome he became domestic chaplain to cardinal Othoboni. His permanent office, however, appears to have been that of canon and treasurer of the church of St. John in his native town of Beverley, where he wrote his *Annals*. This work commences with a fabulous period of British history, and extends down to the 29th year of Henry I. It was published at Oxford in 1716 by Thomas Hearne, and is a remarkable production, for various reasons. Its Latin is extremely good, and even elegant, while its accuracy, especially in dates, is unusual for the age in which its author lived. He is said, though it is very doubtful, to have written, besides the *Annals*, a work on the liberties or privileges of the church of St. John, of Beverley. The work, whoever wrote it, is a translation of old Saxon documents, charters, etc., relative to that edifice, and is still in manuscript. A. d. in 1128 or 1129.

ALUTA, or **ALT**, or **OLT**, a branch of the Danube rising in e. Transylvania, crossing the Carpathians, traversing Wallachia, and emptying opposite Nicopolis about 330 m. long.

ALVA, a village of Stirlingshire, Scotland, pleasantly situated on nearly level ground at the mouth of a romantic glen of the Ochil hills, 7 m. n.e. from Stirling. The part of Stirlingshire in which A. is situated is detached from the rest of the county, and inclosed between the counties of Clackmannan and Perth. A. is a place of great industrial activity, having extensive woollen factories. Formerly the prevailing branch of industry was the blanket trade. In later years this has been entirely superseded by the manufacture of shawls. Tweeds have also been introduced.

Immediately behind the town is Alva glen, noted for its picturesque beauty and magnificent water-fall. About a mile to the w. of the village is Balquharn Glen, also a very romantic spot. Pop. '61, 3147; '81, 4961; '91, 5225.

ALVA, DUKE OF. See **ALBA**.

ALVARA'DO, a t. of Mexico, in the department of Vera Cruz, on the gulf of Mexico, at the mouth of the river Alvarado, 40 m. s.e. from Vera Cruz. The situation, close to a lagoon, is unhealthy. A bar at the mouth of the river prevents the entrance of vessels of more than 12 or 13 ft. draught, but within the bar the harbor is sheltered from every wind. Great part of the t. consists of cane-built cottages, roofed with palm-leaves. The river has a course of not much more than 100 m., but collects the waters of an extensive swampy district. Much rice and cacao are produced in the country around Alvarado. Pop. 6000.

ALVARA'DO, PEDRO DE, a famous companion of Cortes, was born at Badajoz in Spanish Estremadura, about the year 1485. In 1517 or 1518, he sailed for the new world, and in the same year was dispatched from Cuba, by Velasquez, the governor of that island, to explore, under the command of Grijalva, the shores of the American

continent. The expedition touched at Acozamil (the isle of Swallows), and at various places in Yucatan. Ascending also the rivers Tobasco and Banderos, Grijalva was so enchanted with the beauty of the country, its fine cultivation, and the numerous traces of advanced civilization, that he named it *New Spain*. Now, for the first time, the Spaniards heard of the riches of Montezuma, and of his vast empire. A. was ordered to return to Cuba, and inform Valasquez of the result of the expedition. The sight of the gold which A. brought with him, stimulated the covetousness and ambition of Velasquez, who became greatly incensed against Grijalva, because the latter had not penetrated further into the new region, and on his return to Cuba deprived him of his command. In Feb. 1519, Cortes sailed from Havana, solely for the purpose of conquest, with eleven ships, containing 508 soldiers and 109 seamen. A. commanded one of these ships; but a storm separating the fleet, he arrived at the rendezvous, isle of Swallows, three days earlier than the others. Here the conquest of Mexico was planned by these intrepid adventurers. A. figured in every conspicuous incident; he was, indeed, hardly less distinguished than the sagacious Cortes himself, who knew his worth, and whom he served with unfaltering zeal and fidelity. While he held the city of Mexico, during the absence of his chief, he massacred, in the midst of a fête, a great number of Aztec nobles, which act is said to have excited the indignation of Cortes; but, on the other hand, it is asserted that the Mexicans had plotted the destruction of the Spaniards, and that A. had become cognizant of the scheme. In the famous night-retreat of 1st July, 1520, A. commanded the rear-guard. After the conquest of Mexico, he was sent, in 1523, at the head of 300 foot, 160 horse, with 4 pieces of cannon, and a troop of Mexican auxiliaries, to subdue the tribes on the coast of the Pacific in the direction of Guatemala. He was completely successful, receiving everywhere the submission of the native chiefs, while the people brought him presents, in token of the sincerity of their friendship. He now returned to Spain, where the emperor, Charles V., gave him a splendid reception, and appointed him governor of Guatemala. On departing again for the new world, he was accompanied by numerous friends and cavaliers desirous of making their fortune. His adventurous spirit soon launched him into new enterprises. Pizarro and Almagro were prosecuting a brilliant career of conquest in South America. A. resolved not to intrude upon their territories. He considered the province of Quito to be without the limits of these, and so, embarking with a force of 500 soldiers, 227 of whom were cavaliers, he landed at Bahia de los Caraques, near cape San Francisco, whence he penetrated into the heart of the country, crossing the Andes by as bold and hazardous a march as it is possible to conceive. In the plain of Rio Bamba, he was met by some of the troops of Pizarro, headed by Almagro; but instead of disputing by force of arms his right to the possession of the country in which he found himself, he agreed to retire, on receiving an indemnity for his arduous undertaking. He therefore retired to Honduras, and aided the colonists in establishing new settlements, amongst others Gracias-a-Dios and San Juan de Puerto de Caballos. Meanwhile, Pizarro, loaded with wealth, went back to Spain in 1534, and misrepresented the conduct of A. to the emperor; but the latter following, vindicated himself so successfully, that he received the government of Honduras in addition to Guatemala. Again he embarked for the new world, and pursued his course of discovery and conquest; but in an affray with the Indians upon the coast of Michoacan, in 1541, he was accidentally killed by his horse falling upon him and crushing him. In the same year, an inundation, accompanied by a frightful tempest, overthrew the walls of the town of San Jago, when his wife and children all perished.

ALVAREZ, FRANCISCO, 1460-1540; a priest, and almoner to king of Portugal; sent in 1515 as secretary to an embassy to the king of Abyssinia. In 1533, he went to Rome on an embassy to Clement VII. A. published an account of his travels, curious but not trustworthy, as, like most travelers of his time, he was extremely credulous.

ALVAREZ, Don JOSE, a Spanish sculptor, was b. Apr. 23, 1768, at Priego, in the province of Cordova. During youth he labored with his father, a stone-mason; and when 20 years old, began to study drawing and sculpture in the academy of Granada. His early essays in sculpture secured for him the patronage of the bishop of Cordova, and in 1794, he was received into the academy of San Fernando, where, in 1799, he gained the first prize in the first class. Subsequently, he gained the second prize for sculpture in the institute of Paris, and in 1804, increased his celebrity by a plaster-model of Gany-mede, which proved that he could rival Canova in gracefulness of style. He now attempted greater works in the more severe style, and prepared a model for a wounded Achilles, which was accidentally broken. Having removed to Rome, he was here employed by Napoleon to design bas-reliefs for the Quirinal palace on Monte Cavallo; but, on account of political changes, his works were not allowed to occupy the places for which they had been destined. In Rome, where he lived on terms of friendship with Canova and Thorwaldsen, he executed, among other works, his *Grupo Colosal de Zaragoza*, now in the royal museum of Madrid, representing a scene in the defense of Saragossa. This work alone is sufficient to establish A.'s fame. Clearness of design, dignified simplicity in execution, truthfulness to nature, and deep sentiment, mark the sculptures of A., who, next to nature and classical antiquity, studied the works of Michael Angelo. He d. in Madrid, Nov. 26, 1827.

ALVAREZ, JUAN, 1780-1867; a Mexican general and statesman. He led the revolt which deposed Santa Anna in 1855, and became president in his place, but resigned the next year. He was one of the most determined opponents of Maximilian and the French invasion.

ALVENSLEBEN, CONSTANTINE VON, 1809-92; b. in Prussian Saxony; military officer. He was trained in the cadet corps; served through the Danish war, and in the war with Austria; commanded the 3d army corps in the Franco-German war. He retired in 1873. One of the forts at Metz was named in his honor. In 1895 the grand general staff of Germany published a history of the battles at Spicheren and Vionville, or Mars-la-Tour in which Gen. Alvensleben was warmly credited with being the hero of two great strategic actions in the war of 1870-71, and one of the most important of the military founders of the German empire.

ALVINCZY, or ALVINZY, JOSEPH VON, BARON, 1735-1810; an Austrian field-marshal, distinguished in the seven years' war at Torgau and Toplitz. He took part in the campaign against the Turks in 1789, but did not take Belgrade. Though oftener losing than winning, he was selected to lead the Austrian army against Bonaparte; but, having lost the important battles of Arcola and Rivoli, he was recalled. In 1798 he was made superior commander of Hungary, and reorganized the army; was field-marshal, 1808.

ALVIS ("all-wise"); in Norse mythology, the dwarf who answers Thor's questions in the lay (song) of Alvis.

ALVORD, THOMAS GOLD; b. Onondaga, N. Y., 1810; graduated at Yale college, 1828; admitted to the bar, 1832; since 1844 has been repeatedly elected a member of the New York state assembly; was speaker of the assembly, 1858-64 and '79; lieutenant-governor of the state, 1865-6, and member of the constitutional convention, 1867-8.

ALWAR, a Rajpoot state of India, under the control of the governor-general's agent for the states of Rajpootana, but having a considerable measure of independence. It lies between n. lat. 27° 14' and 28° 13', and between e. long. 76°, 14' and 77° 15'. Its area is about 3000 sq. m.; its pop. about 800,000. In the western part of the state the surface is broken by mountains, the outlying peaks of the Aravalli range, which abound in minerals, particularly in iron, the ore lying near the surface. A large part of the population are employed in the smelting furnaces. Copper, silver, lead and sulphur are also found. In the east the land is more level and supports a numerous agricultural population. The capital is Alwar; pop. '91, 52,398.

ALZEY, or ALZEI, an old city in Rhenish Hesse, on the Selz, 18 m. s. w. of Mentz: pop. 5,900; tanning and tobacco manufacturing are the chief industries. The t. was founded in Roman days, and had its own lords in the middle ages, the ruins of whose castles are still visible.

ALZOG, JOHANN BAPTIST, 1808-78; a Roman Catholic theologian. He was professor of church history in the university of Freiburg, and wrote a *Hand Book of Universal Church History*, which is known in many languages. He was also the author of an *Outline of Potrology*, and in 1869 was a member of the commission on dogma which prepared the work for the Vatican council. He was the only member of the commission who opposed the promulgation of the dogma of papal infallibility.

AMADEUS (i.e., Love-God), a common name in the house of Savoy. The first who bore it was count A., eldest son of count Humbert, who lived about the commencement of the 11th century. His successors gradually enlarged their paternal dominions; but the first to make an important figure in history was A. V., who was b. in 1249, succeeded his uncle Filippo in 1285, and d. in 1323. He acquired the dignity of a prince of the empire. He had a brother who resided for a long period in England, and, while there, built the Savoy palace in London.—His son, A. VI., the "green count," b. in 1334, succeeded his father in 1343. He was a sagacious, moderate, and vigorous ruler, won various places from the dauphin of France, became lord-paramount of Piedmont, and, through the favor of the emperor Charles IV., obtained the vice-regency over a great part of upper Italy. His influence among the Italian states was very great. He d. in 1383.—A. VIII., b. in 1383, was at first under the guardianship of his grandmother, a woman of superior talents; but in 1398 he assumed the reins of government himself, and displayed a spirit of moderation, and, at the same time, a love of order which augured well for his people. The zeal with which he aided the policy of the emperor Sigismund secured him the imperial favor, and the elevation of Savoy into a duchy (1416). On the extinction of its native dynasty, in 1418, Piedmont chose him for its ruler, as he was next of kin. But a religious melancholy taking possession of his mind, he (Nov. 7, 1434) laid down his authority, and, along with six of his knights, betook himself to a monastic hermitage which he had caused to be built on the shores of the lake of Geneva. He was elected pope in 1439, when he assumed the name of Felix V.; but he resigned the papal chair in 1448, and d. three years afterwards at Geneva.—A. IX., after governing for four years, handed over his authority to his wife Jolanthe, on account of ill health; but she used it very imprudently. While he lived, A. was a mere tool in the hands of grasping factions. He died in 1472.

AMADEUS I., AMADEO FERDINANDO MARIA, b. May 30, 1845; duke of Aosta, king of Spain, second son of Victor Emanuel, king of Italy. He was rear-admiral in the Italian navy, and lieutenant-gen. in the army. He married, May 30, 1867, Princess

Marie del Pozzio della Cisterna, daughter of the countess de Merode. They have three children, Emanuel, Victor, and Louis. On the 4th Dec., 1870, A. accepted the crown of Spain, with the sanction of his father and the approval of the great powers. He reached Madrid Jan. 2, 1871, four days after the assassination of Gen. Prim. He himself was assailed by assassins in July, 1872, and also troubled with Carlist risings. On the 11th Feb., 1873, he abdicated for himself and heirs, and returned to Italy, the Spanish cortes proclaiming the republic and making Figueras provisional president. He died in 1890.

AM'ADIS, a much-used heroic name in chivalric poetry. At the head of those heroes of romance, stands A. of Gaul, called the lion knight, from the device on his shield, and also Beltenebros, or the darkly beautiful. The other Amadisès that figure in romance are represented as descendants more or less remote of A. of Gaul. He himself was what the Germans called a love-child of the fabulous king Perion of France and of Elisena, a princess of Bretagne. The relationship of several of the other Amadisès to the princes and princesses of Colchis, Trebizond, Greece, and Cathay, that figure as their parents, is of the same unsanctioned kind. The romance which narrates the adventures of A. of Gaul is both the most ancient and the best of all the A. romances. It even found favor in the sight of Cervantes, who won immortal honor by overthrowing the long usurped dominion of this "evil sect." This one, however, has maintained its reputation even to the present day, not only because it was regarded by him as a literary curiosity, but also from its own merits, as the original production of a creative fancy.

The question which was early raised, and cannot yet be demonstratively settled, as to whether this romance was originally a Portuguese, a Spanish, or a French production, proves at least the absence in it of all national peculiarities, and the entire want of all national traditions connected with it; and hence the want also of a living historical background, which, in the case of all really national legends, is discernible through the purely epic structure. It may be asserted with certainty, both from internal and external evidence, that this romance is the pure subjective creation of the fancy of a single individual; and that it was composed at a time when the genuine epic style of chivalric writing was near its decline, consequently not earlier than 14th century. It is also apparent that this romance must have been originally written in prose, and intended to be read, and not to be recited. Lastly, it is not to be doubted that the author was well acquainted with the earlier legendary poetry, and has imitated it in many things, but has, nevertheless, struck out for himself a perfectly new path, in an opposite direction, which naturally tended to lead his less gifted imitators into a bottomless abyss, and at last brought about the extinction of the whole class. For these chivalric romances—doubtless unintentionally—became by degrees more and more of an ironical cast; and only a genius like Cervantes was wanting in order to complete their extinction, by making the comic element the fundamental tone, and exaggerating the incongruity inherent in such compositions.

The Spanish A. romances consist of fourteen books, of which the first four contain the history of A. of Gaul. Yet, according to the researches of the learned Clemencin, as stated in his *Commentary on Don Quixote* (Madrid, 1833), it can scarcely be doubted that this most ancient part was originally written in the Portuguese language, by the knight Vasco de Lobeira of Oporto, who died in 1403; and that it must have been composed between 1342 and 1367. The original manuscript is said to have been first in the possession of the infant Alfonso of Portugal, the son of John I., the founder of the house of Braganza, who died in 1461; and last, in that of the duke of Aveiro, and to have been destroyed during the earthquake in Lisbon in 1755. At least, these first four books have only been preserved in the Spanish translation which was made by Garcia Ordoñez de Montalvo, about 1460, and was first printed between 1492 and 1505. The same Montalvo added to it the fifth book, *Las Sergas* [ergas, i.e., actions or deeds] *de Esplandian, Hijo de Amadis de Gáula*. He began this book in 1485, but did not complete it till 1492. The books from the 6th to the 14th contain the exploits and adventures of Florisando, by Paez de Ribera; of Lizuarte of Greece, and of Perion of Gaul, by Juan Diaz; of A. of Greece, of Florisel of Nicea, and of Anaxarte, by Feliciano de Silva; of Rogel of Greece, and of Silves de la Selva, by the same; of Lepolemo, and of Leandro the fair, by Pedro de Lujan; and lastly, of Penelva, by an anonymous Portuguese. The French translators and continuators, beginning with Nicolas de Herberay, Sieur des Essarts, who published the first eight books between 1540-48, have increased this series of romance to 24 books. Gilbert Saunier, Sieur de Duverdiér, has written a conclusion, in seven large volumes, to all the adventures begun in the whole series of legends, which he has called *Le Roman des Romans*.

How popular and widely circulated these romances were in their day, may be proved by the many editions of single legends, by the translations of most of them into Italian, English, German, and even into Dutch, and also by the numerous chivalric romances written in imitation of them. As, nevertheless, a change came over the public taste, they almost all fell into oblivion, and indeed justly so, because of their want of intrinsic merit. They were transferred from the temple of the muses to the literary lumber-room, where now at best they only serve to feast the eyes of bibliomaniacs. A. of

Gaul has been deservedly excepted from this fate, and has not only found readers in the present day, but has been in modern times translated, revised, and imitated. The Portuguese Gil-Vicente, and the Spaniard Andrés Rei de Artieda, extracted from it the materials for two Spanish comedies. De Lubert and count Tressan revived this romance in tasteful extracts; and as Bernardo Tasso formerly did in his *Amadigi*, so now Creuzé de Lesser and William Stewart Rose have extracted from it the materials for epic poems: *A. de Gaule, Poème faisant suite aux Chevaliers de la Table ronde* (Paris, 1813), and *A. of Gaul*, a poem in three books (London, 1803.) On the other hand, Wieland's *Neuer A.* has nothing in common with the more ancient Amadis, except the title. See Baret, *De l'Amadis de Gaule* (Par., 1873.)

AMADOR, a co. in California, drained by the branches of the San Joaquin; area, 568 sq. m.; pop. '90, 10,320. Gold, copper, and marble abound; grain, wool, and wine are the chief products. Co. seat, Jackson.

AMADOU, a name given to *polyporus igniarius* and *P. fomentarius*, fungi of the tribe or division *hymenomyces*, and formerly included in the genus *boletus*. They grow upon old trees in Britain, and on the continent of Europe. The pileus is completely blended with the hymenium, which is pierced with thin-sided, rather angular, tubular, vertical passages—the whole fungus thus appearing as a leathery or fleshy mass; the under side of which is pierced by deep pores. *P. igniarius* is called hard A., or touchwood. *P. fomentarius* is called soft A., or German tinder. They are used as styptics for stanching slight wounds; and when steel and flint were in general use for striking fire, were much employed as tinder, being prepared for this purpose by boiling in solution of niter. The soft A. is used for making small surgical pads, for which its elasticity peculiarly fits it. *P. fomentarius*, or a very similar species, is found in India, and used there as in Europe. It is also employed by the Laplanders and others for moxa (q. v.). It is sometimes made into razor-strops, and this use is likewise made of *P. betulinus*.—*P. officinalis*, the agaricon of Dioscorides, which grows upon larch-trees in the s. of Europe, is a drastic purgative, now rarely employed. *P. suaveolens*, which grows upon the stems of willows, and is easily recognized by its anise-like smell, was formerly employed in medicine, in cases of consumption, under the name of *fungus salicis*. All these species are very similar in appearance. Another species of the same genus, *P. destructor*, is one of the fungi known by the name of DRY ROT (q. v.).—The remarkably light wood of *hernandia guianensis*, a shrub of the natural order *thymelæaceæ* (q. v.), is readily kindled by flint and steel, and is used in Guiana as amadou. See illus., MOSSES, ETC., vol. X.

AMAIN, a peculiar phrase applied by sailors to signify *at once or suddenly*.

AMALARIC, 501–531; the last Visigoth king of Spain. He married Clotilda, daughter of Clovis, king of the Franks, in 527, and treated her so badly because she would not embrace Arianism that her brother Childebert came against him, and defeated him, A. being killed while in flight.

AMALEKITES, one of the most fierce and warlike of the Canaanitish nations. They dwelt “in the land of the south” (Numbers, xiii. 29), that is, in the land s. of Palestine, or between Idumea and Egypt. From the very first, they manifested an uncompromising hostility to the Israelites, whose rear-guard they smote after the passage through the Red sea. In consequence of this, they received no mercy at the hands of the Israelites, when the latter had established themselves in Palestine. Saul (1 Samuel, xv. 2) nearly annihilated them. Twenty years later, David, while dwelling amongst the Philistines, penetrated into their land, and made dreadful slaughter of them. After this, they made a last desperate reprisal, but were overtaken by David in the midst of their drinking and dancing; and “from twilight, even unto the evening of the next day,” he smote them, “and there escaped not a man of them, save 400 young men who rode upon camels and fled.” The descendants of these were finally extirpated in the days of Hezekiah, king of Judah, by the Simeonites.

AMALFI, a seaport on the gulf of Salerno, on the e. coast of southern Italy, contains about 7000 inhabitants; has a very ancient cathedral, and is the seat of a bishop. It is said to have been founded under Constantine the great, and was long a powerful and independent state, having at one time a pop. of 50,000; and about the close of the 11th c., fell under the power of the Normans. The maritime laws of A. (*tabula amalphytana*) once prevailed throughout Italy. The unique manuscript of the pandects (q. v.) was discovered at A.; and Flavio Gioja, the inventor of the compass, and Masaniello, were born there.

AMALGAM is the term applied to that class of alloys (q. v.) in which one of the combining metals is mercury. On the nature of the union, it has been observed that “on adding successive small quantities of silver to mercury, a great variety of fluid amalgams are apparently produced; but in reality, the chief, if not the sole compound, is a solid A., which is merely diffused throughout the fluid mass.” The fluidity of an A. would thus seem to depend on there being an excess of mercury above what is necessary to form a definite compound. Mercury unites readily with gold and silver at the usual temperature. It has no disposition to unite with iron even when hot. A solid A. of tin is used to silver looking-glasses.

Amalgamation is employed on a small scale in some processes of gilding, the silver

or other metal being overlaid with a film of gold A., and the mercury being then driven off by heat. But its most extensive use is in separating gold, and especially silver, from certain of their ores. The mercury dissolves the particles of the metal, and leaves the earthy particles; it is then easily separated from the gold or silver. This process, discovered in Mexico in 1557 by Bartolomé de Medina, is very extensively used in Mexico at the present time, and has lately been introduced with great success into the Californian and Australian gold-fields. The mode of application is to crush the quartz rock which serves as the matrix in which the small particles of gold are imbedded; place the fragments in a barrel or revolving drum with mercury, and agitate for some time. The mercury attaches all the gold particles to itself; and in the apparatus, when fully agitated, there is found a semi-fluid mass, which is the mercury, appearing half congealed, and containing all the gold. It is only necessary to place this A. in a retort and apply heat, when the mercury sublimes over—and can be re-employed for further amalgamation—and leaves the gold in the body of the retort. This process is the only known method of separating the finer particles of gold from a mass of rock, and is always used by the gold-crushing companies.

Several amalgams may be regarded as definite chemical compounds. Thus, when gold-leaf is placed in mercury, and the A. so produced filtered by being squeezed in a chamois-leather bag, the uncombined mercury oozes through the skin, but a definite A. of 2 of gold and 1 of mercury remains behind in the leather filter. Tin A. is employed in silvering looking-glasses, and is formed by laying a sheet of tin-foil on a table, covering it with mercury, and then placing, by a sliding movement, the sheet of glass over it. This A. contains 3 of mercury and one of tin; glass balls are silvered with an A. of 10 mercury, 1 tin, 1 lead, and 2 bismuth. A silver A. highly crystalline—and from the clusters of crystals somewhat resembling a tree, called *arbor Diana*, or tree of Diana—is prepared from 3 parts of the strongest solution of nitrate of silver, 2 parts of solution of proto-nitrate of mercury added to an A. of 7 mercury and 1 silver. In a day or two, the arborescent appearance presents itself, and the crystals contain 65 per cent mercury and 35 silver. The A. used for frictional electric machines is made from 1 tin, 1 zinc, and 3 mercury, to which sand is afterwards added.

AMALGAMATION. See GALVANIC BATTERY.

AMALIE, ANNA, Duchess of Saxe-Weimar, an amiable lady, and generous patron of literature, was b. in 1739, and, during the latter part of the 18th c., was the center of the court of Weimar. Left a widow in the second year of her marriage (1758), her judicious rule, as guardian of her infant son, enabled the country to recover from the effects of the seven years' war; while her efforts were no less effectual in promoting the education of the people. She appointed Wieland tutor to her son, afterwards duke, and attracted to Weimar such men as Herder, Goethe, Knebel, Böttiger, Musæus, Schiller; forming a galaxy of genius such as no single court, perhaps, was ever graced with. How much the fine qualities of head and heart possessed by the duchess herself contributed to this success, was shown by the fact that when she resigned the government into the hands of her son in 1775, she continued to be surrounded by the same society. She has the high distinction of having honored and encouraged the greatest writers that Germany has produced. The battle of Jena is said to have broken her heart; she d. (1807) six months after that event.

AMALIE, MARIE, the wife of Louis Philippe, king of the French, was the daughter of King Ferdinand I. (IV.) of the Two Sicilies, and was b. April 26, 1782. When she married Louis Philippe (then duke of Orleans), he was a political exile, without a hope of ever rising to the throne of France. It was a marriage of personal choice on both sides, and was consequently happy. After Louis Philippe's elevation to the throne, the queen avoided interference in political affairs, and devoted her attention to plans of beneficence. In her domestic relations, her conduct was highly exemplary, and won the esteem of all parties; indeed, the only charge ever preferred against her, was her supposed excess of piety. She shared the fortune of her exiled husband, and was very respectfully received in England. Louis Philippe, shortly before his death (at Claremont, 1850), gave expression to the love and esteem with which he regarded his faithful wife. She d. at Claremont in 1866.

AMALIE, MARIE FRIEDERIKE, b. Dec. 21, 1818; queen of Greece; daughter of grand duke Paul and half-sister of grand duke Nicholas, of Oldenburg. She married King Otho of Greece, Nov. 22, 1836, and was much beloved for firmness, benevolence, and many other virtues. During the foreign occupation of Athens, in 1856, she acted as regent. In 1861 a Greek student shot at but failed to kill her. After her husband's deposition in 1862 she accompanied him to Bavaria, residing after his death at Bamberg. She died in 1875.

AMALIE, MARIE FREDERIKE AUGUSTE, 1794–1870; a German duchess and dramatist, eldest sister of King John of Saxony. Many of her dramas have been adapted to the French and English stage. She also wrote operas and sacred music.

AMALRIC, ALMAURIC, or AMAURI of BENA, founder of a school of Pantheists known by his name. He lectured in Paris about 1200 or 1204. His doctrines were condemned by the university; the Pope confirmed the condemnation, and ordered A. to

return to Paris and recant, which he did in 1207. He died two years later, and in the same year two of his followers were burnt before the gates of Paris; his own body was also dug up, burned, and the ashes thrown to the winds. His doctrines were formally condemned by the fourth Lateran council in 1215.

AM ALS, or **AMALI**, a royal family of the Goths, furnishing all their sovereigns until the separation into Ostro and Visigoths, after which the Ostro kings were A. until the end of the male line in Theodoric the Great. The name A. is thought to have meant "spotless."

AMALTHE'A, the nurse of the infant Jupiter, supposed to have been a goat; with her two young, metamorphosed into stars. It is said that Jupiter broke off one of her horns which he endowed with power to fill with whatever the holder wished, and this was the "cornucopia," or horn of plenty.

AMANDE DE TERRE. See **CYPERUS**.

AMANI TA, a genus of fungi, nearly allied to *agaricus*, but bursting from a *volva*. *A. muscaria*, which is pretty common in woods, especially of fir and beech, in Britain, is one of the most dangerous fungi. It is sometimes called **FLY AGARIC**, being used in Sweden and other countries to kill flies and bugs, for which purpose it is steeped in milk. The pileus or cap is of an orange-red color, with white warts, the gills white, and the stem bulbous. It grows to a considerable size. Notwithstanding its very poisonous nature, it is used by the Kamtchatkadeles to produce intoxication, and it imparts an intoxicating property to the urine of those who swallow it, of which they or others often avail themselves, when abundance of the fungus is not at hand.

AM'ARANTÉ (anc. *Ante Moranam*), a t. of Portugal, in the province of Minho, on the Tamega, a branch of the Douro, 32 m. n.e. from Oporto. The Tamega is crossed by a handsome stone bridge. The t. is well built, but dull and decayed. A church, erected in the 16th c., is an interesting specimen of the flamboyant style. A. was the scene of a fierce conflict between the French and the Portuguese in 1809, when the bridge was defended by the Portuguese for several days, and the French committed great barbarities. Pop. 2500.

AM'ARANTH, *Amaranthus*, a genus of plants of the natural order *amaranthaceæ*. This order contains nearly 300 known species, natives of tropical and temperate countries, but chiefly abounding within the tropics. They are herbs or shrubs, with simple exstipulate leaves, and flowers in heads or spikes; the perianth usually colored, 3 to 5 partite, hypogynous, scarious, persistent, generally surrounded with small bractæ; the stamens hypogynous, either 5, and opposite the segments of the perianth, or some multiple of 5, distinct or united into a tube, sometimes partly abortive; the anthers either 2-celled or 1-celled; the ovary single, superior, 1-celled, with 1 or few ovules, which hang from a free central cord; style single or absent; stigma simple or compound; fruit, a small membranous bag or utricle, or a caryopsis (q.v.), rarely baccate; seeds lense-shaped, externally crustaceous, embryo curved round the circumference; albumen farinaceous.—The genus *amaranthus* has mostly monœcious flowers (although the order is generally hermaphrodite), with two or three stigmas, and a 1-celled, 1-seeded utricle, bursting all round transversely. Some of the species are naturally of singular form, and others assume singular but monstrous forms through cultivation. *A. caudatus* (love-lies-bleeding), *A. cruentus*, *A. hypochondriacus* (prince's feather), and other species, are common annuals in our flower-gardens. The spikes of *A. caudatus* are sometimes several feet in length. The dry red bracts which surround the flower retain their freshness for a long time after being gathered; for which reason the plant has been employed by poets as an emblem of immortality.—The globe *A.* (*gomphrena globosa*) and the cockscomb (q.v.), well-known tender annuals, belong to the same natural order. The globe *A.* is much cultivated in Portugal and other Roman Catholic countries for adorning churches in winter. Its flowers, which are of a shining purple, retain their beauty and freshness for several years. No species of the order can be regarded as a true native of Britain, although *amaranthus blitum* is now found in waste places near London and elsewhere. *A. blitum*, *A. oleraceus* (chusan han-tsi), and other species, are used as pot-herbs; but rarely in Britain. Wholesome mucilaginous qualities are very generally found in the leaves throughout the order. The seeds of *amaranthus frumentaceus* (called *kiery*) and of *A. anarthana* are gathered as corn-crops in India.—Medicinal properties are ascribed to some species of the order, particularly to *gomphrena officinalis* and *macrocephala*, which have a high and probably exaggerated reputation in Brazil as cures for many diseases.

AM'ARAPURA, or **UMMERAPOORA**, now a city of the past, was, before 1853, the capital of Burmah, and was situated on the left bank of the Irrawaddy, 9 m. n.e. from Ava, in lat. 21° 57', long. 96° 7'. It was founded in 1783, and made the capital of the empire. In 1810, it was totally destroyed by fire, and in 1839 almost totally by an earthquake. In 1852–53, by order of the king, A. was finally deserted, and the capital of the country fixed at Mandalay. Nothing remains of the old city but some rows of beautiful trees and a few ruined pagodas. In a temple between A. and Mandalay is a famous colossal bronze image of Gautama (Buddha). Its population, which in 1810 was estimated at 170,000, declined to less than 5,000 after Mandalay became the capital.

AMARA-SIN'HA, a celebrated Hindoo grammarian of great antiquity, who wrote a variety of works, only one of which has come down to us, the *Amara-Kosha*, or thesaurus of Amara; sometimes called the *Trikanda*—i.e., the tripartite. Regarding the author's life, little is known, nor is the precise period during which he flourished definitely ascertained. He is generally supposed to have been one of the "nine gems" who adorned the throne of king Vikramaditya I. (56 B.C.). But Mr. Bentley (*Asiatic Researches*) places him as late as the 11th c. A.D., while Mr. Colebrooke assigns the close of the 5th as the most probable. He is known to have been a Buddhist; and it is universally believed that his writings perished during the fierce persecution to which that sect was subjected by the orthodox Brahmins, in the 3d, 4th, and 5th centuries. This tradition harmonizes with the earliest of the three ages in which he is said to have lived.

The *Amara-Kosha* is a Sanscrit vocabulary, divided into 3 books and 18 chapters, and containing in all about 10,000 words. The words are classed according to the nature of the things signified by them. Almost all the grammarians of Hindostan imitate, translate, or comment upon the work of A.

An excellent edition of the *Amara-Kosha*, with notes in English and an index, was published by Colebrooke, 1808 (reprinted 1829); the Sanscrit text at Calcutta in 1813; and in 1839, a French translation.

AMARI, MICHELE, an Italian historian and orientalist, was b. at Palermo, July 7, 1806. At the age of 16, he entered a government office; and shortly after—his father being condemned to 30 years' imprisonment for a political crime—the duty of supporting his mother and the other members of the family devolved upon him. His straitened circumstances soured him; and he even meditated becoming a bandit, but was roused from his morbid wretchedness by falling passionately in love with an English lady. Although he did not win her hand, he secured a knowledge of the English language, the first result of which was a translation of Sir Walter Scott's *Marmion*, published at Palermo in 1832. A. soon became a political "*suspect*;" and although he had conducted himself during the tumult of 1837 with exemplary moderation, he was summarily transferred to a situation in Naples, where he remained four years, and where he pursued with the utmost diligence his historical investigations. In 1842 appeared his *La Guerra del Vespro Siciliano* (The War of the Sicilian Vespers), which has been often republished, and remains the master-piece of its author. Its great merit arises from its having successfully combated the common notion that the terrible massacre so named was the result of a deep and ramified conspiracy on the part of the nobles. A. proves from a letter of Charles of Anjou himself, as well as from numerous other sources, that it was a popular or national outbreak, occasioned by the tyranny of the foreign rulers, that really brought about the deliverance of Sicily. The book was quickly prohibited, and, as a consequence, widely read. It was translated into German by Dr. Schroëder of Hildesheim, and into English by Lord Ellesmere. A. was now ordered to Naples, but fled to France, where he gave himself up to the study of Arabic and modern Greek, and to the preparation of his *History of the Mussulmans in Sicily*. At the revolution of 1848, he returned to Palermo, where he had been appointed professor of public law, but shortly after his arrival was elected vice-president of the committee of war. He was next sent on a diplomatic mission by the provisional government to France and England. In 1849, he published at Paris *La Sicile et les Bourbons*, to show up the pretensions of the Neapolitan sovereign. After the Sicilian insurrection had been quelled, A. took up his residence in Paris, where he devoted himself to literary pursuits till 1860, when he returned to Italy. He was made senator next year, and in 1863-4 was minister of instruction. Other writings of A. are upon the language and history of the Arabs, in the *Revue Archéologique*, the *Journal Asiatique*, etc. He d. July 16, 1889, at Florence.

AMARYLLIDÆ, or AMARYLLIDACEÆ, a natural order of monocotyledonous plants, including many species distinguished by the beauty of their flowers. They are herbaceous plants, or when, as in the genera *agave* and *fourcroya*, they form woody stems, they have still the character of gigantic herbaceous plants rather than of shrubs. The greater part are bulbous-rooted. The leaves are sword-shaped, with parallel veins; the flowers have spathaceous bracts. The perianth is regular, 6-cleft, sometimes with a corona. The stamens are 6, arising from the perianth, sometimes cohering by their dilated bases; the anthers bursting inwardly. The ovary is inferior, 3-celled, with 1, 2, or many anatropal ovules; the style is single; the stigma, 3-lobed. The fruit is a 3-celled, 3-valved capsule, or a 1 to 3 seeded berry. The seed is albuminous, with the embryo nearly straight.—There are about 400 known species of this order, natives of tropical, or sub-tropical, and, more sparingly, of temperate regions—particularly abundant at the cape of Good Hope. A few species only are European. Many of them are much-prized ornaments of our gardens and hot-houses. Amongst these are different species of NARCISSUS (q. v.), AMARYLLIS (q. v.), CRINUM, (q. v.), ALSTROEMERIA (q. v.), NERINE, COBURGIA, BRUNSVIGIA, PANCRACTIUM, FOURCROYA, etc. To this order belong the SNOWDROP (q. v.) and SNOWFLAKE (q. v.), and it includes also the AMERICAN ALOE (*agave*, q. v.).

AMARYLLIS, a genus of bulbous-rooted plants of the natural order *amaryllidæ* (q. v.), having a simple 6-partite perianth, and containing a large number of species, natives of the warmer regions of the globe. Many of them have flowers of very great beauty. A species of this genus, *A. formosissima*, was brought to Europe from South America in the

end of the 17th c., and has since been in common cultivation as a garden-flower. Its flowers are of a beautiful red color, exhibiting a play of golden gleams in the sunshine. They are scentless. *A. amabilis*, *A. Josephina*, and *A. vittata* are amongst the most admired bulbous-rooted plants. *A. Sarniensis* is one of the most hardy species, flowering freely in Guernsey, with a little protection during winter, and commonly called Guernsey lily, although it is supposed to be a native of Japan. By artificial impregnation, a great number of hybrid forms have been produced in this genus.

AMASIA, **AMASIEH**, or **AMASIYAH** (anc. *Amasia*), a t. of Asia Minor, the principal t. of the vilayet of Sivas, on the right bank of the Yeshil-Irmak, about 80 m. from the mouth of the river, and 200 m. s.w. from Trebizond. It stands in a deep and narrow valley, and the river flows through a narrow channel, between precipitous rocky banks. The streets are narrow and crooked; the houses mostly of wood, although some are of stone, all covered with tiles. The river is crossed by three stone bridges, and one wooden bridge. One of the stone bridges is supposed to be Roman. The ancient town, the birth-place of Strabo, occupied both banks of the river, and the remains of the acropolis crown a lofty rock on the side of the river opposite to the present town. There are numerous other interesting remains of antiquity, particularly the tombs of the kings of Pontus, whose capital A. was, excavated in the face of a steep rock, and some Saracenic buildings. Pop. estimated at from 10,000 to 25,000.

AMASIS, first Pharaoh of the 18th Egyptian dynasty. He reigned 1525–1499 B. c. He led the insurrection against the shepherd kings, captured their stronghold of Avaris, and drove them into Palestine. He there began a long series of Egypto-Asiatic wars which carried the arms of his successors beyond the Euphrates.

AMASIS, a king of Egypt. Of humble origin; he rose to be general under Apries, the last king of the line of Psammetichus. Being sent to put down an insurrection, he joined the rebels, and was proclaimed king (569 B. c.). He cultivated the friendship of the Greeks, opened up to them the commerce of Egypt, previously confined to Naucratis, married a Greek wife, and took a body-guard of Greeks into pay. Pythagoras and Solon are said to have visited him. For his alliance with Polycrates, and the singular reason for which Herodotus makes him break it off, see **POLYCRATES**. During his reign of 44 years, he greatly promoted the prosperity and adornment of Egypt. Immediately after his death, the country was conquered by Cambyzes of Persia.

AMAT' DI SAN FILIPPO E SORZO, **LUIGI**, 1796–1878; cardinal bishop of Ostia and Velletri, dean of the sacred college, and vice-chancellor of the Roman Catholic church. He was educated in the ecclesiastical academy of noblemen, and at the age of 23 was appointed prelate. April 29, 1827, he was made archbishop of Nicea *in partibus*, and sent as nuncio to Naples; afterwards as nuncio to Spain. In 1837, he was made cardinal, and the next year sent as legate to Ravenna, where he became the intimate friend of cardinal Mastai-Feretti (subsequently Pius IX.). Pius intrusted A. with the Bologna legation, but he was sent away by the revolution, joining Pius at Gaeta, and in 1852 received the two most lucrative positions in the papal court, vice-chancellor, and archivist of the apostolic letters, retaining both until his death, and from time to time acquiring other offices.

AMATEUR (Lat., *amo*, I love), a person who devotes himself to any art, study, or science, from taste or attachment, without pursuing it professionally.

AMATI, a family of celebrated Italian violin-makers, who lived in Cremona. *Andrea*, the eldest, born about 1520, was descended from an ancient Cremona family, dating as far as the 11th century. He was the founder of the Cremona school of violin-makers. His early instruments are so Brescian in character that he is supposed to have been a pupil of Gaspard di Salo. Few of his violins are extant. His model was small, with high back and belly, amber varnish, and clear, though weak, tone. *Nicolo*, his younger brother, made basses in preference to violins, and was his inferior. *Andrea's* sons, *Antonio* and *Geronimo*, worked together much after their father's style. *Geronimo* also made instruments alone of larger pattern, and changed the shape of the pointed sound-hole. *Geronimo's* son, *Nicolo*, born Sept. 3, 1596, died Aug. 12, 1684, was the most eminent of the family, his instruments being second only to those of his great pupil Antonio Stradivarius (q.v.). *Nicolo Amati's* model is of extreme elegance. The corners are sharply pointed, the backs and bellies of beautiful grained wood, the sound-holes graceful and bold, the scroll of exquisite cut, and the varnish transparent and of a deep, rich hue. As a rule, he worked after a small pattern, but he produced some large violins, which are now called "grand Amatis," and are highly valued. He also made a number of beautiful tenors and violoncellos. His label reads: "Nicolaus Amati Cremonens Hieronimi filii Antonii nepos fecit anno 16—." The Jacobs of Amsterdam and Grancino of Milan were among his most successful imitators. With *Geronimo*, his son, the family of Amati ends. He followed their trade, but made indifferent instruments. See **VIOLIN**.

AMAURO'SIS (Gr. *amauros*, obscure) is a blindness or obscurity of vision caused by disease of the optic nerve, and this cause may be situated either at the origin of the nerve in the brain, in some part of its course, or at its termination in the retina; and of course the degree of blindness will be in proportion to the extent these parts are involved by the disease. See **EYE**. A. may also depend upon causes remote

from the organ of vision; the suppression of accustomed discharges from the body may lead to congestion of the vessels of the brain, and cause A.; and it may spring from many very slight causes, if a predisposition to the disease exists. This is occasionally hereditary. Beer mentions several cases in one family; for three successive generations, all the females who had not borne children became blind in middle age; the males showed a tendency to the disease, but did not become blind. A common cause is exposure to bright light or great heat and light, either natural or artificial, occupation upon minute objects, and employment of the eyes during the hours which ought to be devoted to sleep. In many instances, a single imprudent exposure of the eyes to the operation of some such cause, has been sufficient to extinguish the sensibility of the retina; but, in general, it is from long-continued over-excitement of the organs of vision that they begin to fail, and at last become totally unable to continue their office. The heat of the sun, rage, continued stooping, and fevers or other causes, causing congestion, inflammation, or serous effusion in the head, cause A. Some poisonous substances cause A. suddenly, as belladonna, stramonium, and other narcotics given in large doses; and others, applied to the body every day in small quantities, have the same effect, but more slowly. Tobacco may be justly signalized as a poison of this sort, as also mercury and lead.

Exhaustion of the body and depressing mental affections also are causes of A. But we can seldom attribute its occurrence to the influence of any single remote cause, but to a number of circumstances which have been acting for a length of time upon one individual, either consecutively or together.

We recognize the presence of A. by the history of the case and the appearance of the eyes. The latter have generally a vacant, unmeaning stare, dilated pupils, and do not converge towards an object, but appear to be looking steadfastly at something in the distance. The sclerotic or white of the eye is generally altered in color, and crossed by enlarged blood-vessels. The history of the case varies with the patient. Among the first symptoms are difficulty in calculating distances, as in threading a needle or pouring fluid into a glass; and sometimes there is occasional loss of sight in one eye (*amaurosis vaga*), confusion of vision—sometimes a part of the field of vision will be clear, and part obscured. There are also present spectra or *muscæ volitantes*, which sometimes are permanent, arising from the existence of insensible patches on the retina. Floating specks are merely coincident with the disease.

A. is treated by depletion in the robust, alteratives and tonics in the feeble, and by those remedies which act upon the nervous system, and counter-irritation by blisters or issues behind the ears, or in the neighborhood. Except in very recent cases, the prospect of recovery is slight.

AMAURY, the title of two kings of Jerusalem. A. I. was born in 1135 and reigned from 1163 to 1173. He was the brother of Baldwin III. In 1168 he invaded Egypt, but was driven out by Saladin, who carried the war into A.'s country in 1170. A. II. (of Lusignan) was king of Cyprus 1194, and titular king of Jerusalem in 1198, but never made good his claim to the latter kingdom. He died at Ptolemais in 1205.

AMAXI'CHI, the capital of the Ionian island of Santa Maura or Leucadia, is built on the edge of the shallow lagoons that separate the n.e. part of the island from the mainland. The harbor constructed by the Anglo-Ionian government is protected by a mole, at the end of which is a light-house. It is fitted only for small-craft. A. derives its name from the Greek *amaxai*, "cars," which the Venetian garrison employed in bringing down the oil and wine from the inland districts to the point nearest the fort of Santa Maura, where, subsequently, houses began to be erected. The town has a very mean appearance; the buildings are partly of wood, on account of the frequent earthquakes. Slight shocks occur about once a month. Pop. 7000.

AMAZI'AH, ninth king of Judah, son and successor of Joash. He reigned 29 years, 837-808 B.C. In general his reign was good; the principal event was an attempt to reimpose upon the Edomites the yoke of Judah which they had thrown off in Jehoram's days, and for this purpose A. hired an auxiliary force from Israel of 100,000 men for as many talents of silver—the first mention of a hired or mercenary army among the Jews; but a prophet told him to send back the hired soldiers, which he did, not only losing their services and his money, but exasperating the Israelites, who took the act as an insult, and plundered the towns and people of Judah on their homeward march. But A. was victorious over the Edomites, taking the city of Petra, and slaying 20,000 men. It was, however, a fatal victory; for A., finding some idols of Edom among his plunder, worshiped them; and, elated with his success, undertook to subdue the ten tribes of Israel, but was defeated by their king Joash, and carried a prisoner to his own capital, Jerusalem. Joash satisfied himself by breaking down much of the walls of Jerusalem and plundering the city and temple, leaving A. on the throne after taking hostages for his good conduct. A. died fifteen years later at the hands of conspirators.

AM'AZON, **MARANON**, or **ORELLANA**, a river which, after traversing nearly the entire breadth of South America, enters the Atlantic, through Brazilian territory, by a mouth of about 150 m. in width—a mouth which, though it admits the tide for nearly 500 m., is yet so far from meeting our ordinary notion of an estuary that it repels, or at

least overlays, the ocean to a distance of more than 50 leagues. With its various tributaries—the Napo, the Putumayo, the Yapura, and the Río Negro from the n., and the Ucayale, Tocantins, Tefé, Huallaga, Yavari, Yutay, Yurua, Coary, Purus, Madeira, Tapajos, and the Xingo from the s.—the A. drains 2,500,000 sq.m., an area equal to two thirds of Europe, and is estimated to afford an inland navigation of 50,000 m., a line double the circumference of the globe. In every respect, then, the A. may well claim to be the largest of rivers, excepting only that, in volume of contents as distinguished from volume of discharge, the St. Lawrence, with its computed mass of 11,000 cubic m., has been estimated to be equal to all the other bodies of fresh water on the earth's surface, from the A. downwards. With this exception, which—as the St. Lawrence is really a series of lakes—is rather apparent than real, the Amazon stands forth as the king of rivers, whether trunk be compared with trunk, or branches with branches, alike in essential features and in the area of basin. Viewed as one grand system, the A., from its sources, from which the Pacific may be seen within a distance of 60 m., to its embouchure, comprises a course of about 3000 m.; while, gathering its tribute from both sides of the equator along more than 20° of lat., it presents, perhaps, between s. and n., a longer line of natural communication than even between w. and e. Reckoning from the western range of the Andes, the A. is but little better than a mountain-torrent, till it has burst through the gorges of the eastern range of the chain, where it is overhung by peaks that tower thousands of feet above its bed. But, within 300 m. from the Pacific—a journey of about 20 days for loaded mules—the branch called the Huallaga is practicable for steamers, while, after a run of 325 m., the A. is navigable for vessels drawing 5 ft., growing deeper and deeper and more and more available as it rolls its steadily swelling flood towards the ocean. Nor is this the remotest point of clear navigation from the sea, for the Marañon itself is estimated by Herndon to carry the clear navigation about one fifth higher up, amounting in all to 3360 miles. What an idea do these single threads afford of this matchless net-work of inland navigation! But it is not to its own basin alone, vast as that basin is, that the value of the A. is confined. The Río Tapajos has its navigation separated only by a portage of 18 m. from that of an affluent of the Plata; the Río Branco, the main tributary of the Río Negro, has a water-communication which is only two hours distant from that of the Essequibo; while the Río Negro itself is doubly connected with the Orinoco, receiving from it the navigable Cassiquiare (q.v.), and wanting only a canal over a portage of six hours to complete a still more useful bond of union, whose superior advantages will certainly one day lead to the necessary improvement. In addition to all this, the outlet of this mighty river, besides washing Cayenne, is itself, under nature's guidance, a feeder, as it were, of that highway of nations, the gulf stream. Thus does the A., to say nothing more of its maritime relations, bring its inland navigation, mediately or immediately, to bear, Chili alone excepted, on every country in South America—Venezuela, Ecuador, New Granada, Bolivia, Peru, Brazil, the Guianas, and the several Argentine republics. This is not mere prospect; not only has the basin proper of the A. been more or less frequently traversed, but also the various joints that knit it to other basins have been tested by experience. The grandest and most singular of them all, besides being explored by Humboldt, has been placed beyond a doubt by the denizens of the country. The barge-builders of San Carlos, at the entrance of the Cassiquiare into the Río Negro, have long sent vessels, not only down the Río Negro to Pará, on the lower A., but likewise up the Cassiquiare to Angostura, on the lower Orinoco; thus solving, in their own way, the problem which systematic geographers were elsewhere deriding as worse than a fable—as a sheer impossibility. It was not till 1867 that the navigation of the A. was thrown open, but now regular lines of steamers ply between its mouth and Yurimaguas on the Huallaga. The most important exports sent down the A. are india-rubber, cocoa, cotton, nuts, copaiba, palm-fiber, hides, sarsaparilla, farina, tonka beans, arnotto, and tobacco. Other productions of the countries watered by the A., countries well fitted to become the garden of the world, are coffee, sugar, maize, rice, indigo, grapes, bananas, cabinet-woods, building-timber, game, fish, and precious metals. Steam-boat navigation began on the A. in 1853. In that year, the Amazon navigation company, a Brazilian commercial association fostered by the government, sent its first steamer from Pará, the maritime emporium of the A., to Nauta, in Peru. The Atlantic steamers pass from Pará to the A. by a number of very narrow channels. The name A. is said to be from an Indian word meaning “boat-destroyer” (from the dangerous tidal wave at the river's mouth). The explorer Marañon visited the river in 1503, and Orellana sailed on it in 1540.

The wonderful discoveries made by the late Professor Agassiz (1865–66) in the *fauna* of the waters of the A. have proved what he himself calls “a true revelation for science.” Their importance will be seen by contrast. The number of species of fish on the whole globe known to Linnæus about a century ago was 300; in 1840, captain Wilkes collected only 600 species in a voyage round the world with three ships, in an expedition lasting four years; but Agassiz saw in five months on the A. alone 1300 species of fish, nearly 1000 of them new, and about 20 new genera. The *Vacca marina*, the largest fish inhabiting fresh waters, and the Acará, which carries its young in its mouth, especially when there is danger, are denizens of the Amazon.—See *Brazil and the Bra-*

zilians, by Fletcher and Kidder (London and Boston, 1866); *A Journey in Brazil*, by Professor and Mrs. Agassiz (London, 1868); *A Journey across South America*, by Paul Marcoy; Edwards's *The River A.*; Brown's *Fifteen Thousand Miles on the A.*; H. H. Smith's *Brazil, the Amazons, and the Coast* (1880); Mrs. Marshall's *Between the A. and the Andes* (1882).

AMAZO'NAS, a northern department of Peru; 14,129 sq. m.; pop. 34,245 white and about 60,000 wandering Indians. It is bisected by the Andes, and watered by the Marañon (Amazon) and branches. The soil is very fertile, producing wheat, corn, rice, sugar cane, tobacco, coffee, cocoa, cotton, indigo, cinchona, and sarsaparilla in great profusion. In the forests are mahogany, cedar, and other valuable woods. Capital, Chachapoyas.

AMAZO'NAS, or **ALTO AMAZONAS**, the northernmost province of Brazil; 732,460 sq. m.; pop. '90, 147,915. The limits are not well defined, and the surface is little known, being mostly covered with original forests. The inhabitants are nearly all Indians. Capital, Manáos.

AM'AZONS, **AMAZO'NES**. According to a very ancient tradition, the A. were a nation of women, who suffered no men to remain among them, but marched to battle under the command of their queen, and formed for a long time a formidable state. They held occasional intercourse with the men of the neighboring states. If boys were born to them, they either sent them to their fathers, or killed them. But they brought up the girls for war, and burned off their right breasts, that they might not be prevented from bending the bow. From this custom they received the name of A.; that is, "breastless." Such is the ordinary tale; the origin of which is perhaps to be accounted for by supposing that vague reports, exaggerated and poetically embellished, had reached the Greeks of the peculiar way in which the women of various Caucasian districts lived, performing military duties which elsewhere devolved on husbands, and also of the numerous examples of female heroism which, travelers inform us, still distinguish the women of that region. In later times, however, the word Amazon has been supposed to have some connection with the Circassian word "Maza," signifying the moon, as if the myth of the A. had taken its origin in the worship of the moon, which prevailed on the borders of Asia. Three nations of A. have been mentioned by the ancients. 1. The Asiatic A., from whom the others branched off. These dwelt on the shores of the Black sea, and among the mountains of the Caucasus, especially in the neighborhood of the modern Trebizond, on the river Thermodon (now Terme). They are said to have at one time subdued the whole of Asia, and to have built Smyrna, Ephesus, Cumæ, and other cities. Their queen, Hippolyte, or, according to others, Antiope, was killed by Hercules, as the ninth of the labors imposed on him by Eurystheus consisted in taking from her the shoulder-belt bestowed on her by Mars. On one of their expeditions the A. came to Attica, in the time of Theseus. They also marched under the command of their queen, Penthesilea, to assist Priam against the Greeks. They even appear upon the scene in the time of Alexander the great, when their queen, Thalestris, paid him a visit, in order to become a mother by the conqueror of Asia. 2. The Scythian A., who, in after-times, married among the neighboring Scythians, and withdrew further into Sarmatia. 3. The African A., who, under the command of their queen, Myrina, subdued the Gorgons and Atlantes, marched through Egypt and Arabia, and founded their capital on the lake Tritonis, but were then annihilated by Hercules. See Stricker, *Die Amazonen in Sage und Geschichte* (Berl. 1873).

AMBÁLÁ, a city in India, capital of the district of A., 30° 24' n., 76° 49' e.; an important station on the Scinde, Punjab, and Delhi railway. It is a large walled town in a level and well cultivated country. The pop. is 79,300, including the English military station near by.

AMBAS'SADOR is a title by which the highest order of diplomatic ministers is distinguished, and the person holding such a high commission may be defined to be an officer sent by one sovereign power to another to treat on affairs of state. In a less restricted sense, writers on public law employ the term to denote every kind of diplomatic minister or agent. The credentials, or letters of credence, of an A. are addressed directly by his own sovereign to the sovereign to whom he is sent, and with whom he has the privilege of personal communication. In the performance of all his diplomatic duties, an A. is understood to represent, not only the affairs, but the dignity and the power of his master; and by the law of nations he has many important rights and privileges, the chief of which is exemption from the control of the municipal laws of the nation wherein he is to exercise his functions, an exemption that is not confined to the A. himself, but is extended to all his suite, including not only the persons employed by him in diplomatic services, but his wife, chaplain, and household generally. But there is a dispute among legal writers whether this exemption extends to *all crimes*, or whether it is limited to such offenses as are *mala prohibita*, as coining, and not to those that are *mala in se*, as murder. The law of England appears to have formerly allowed the exemption in the restricted sense only; and in the year 1654, during the protectorate of Cromwell, the Portuguese A. was tried, convicted, and executed, for an atrocious murder. But now, according to the general practice of this country, as well as that of the rest of Europe, it is considered that the security of an A. in conducting the inter-

course of nations, is of more importance than the punishment of a particular crime, and therefore few examples have happened in modern times where an A. has been punished for any offense. In regard to civil suits, it was at one time held and laid down by Sir Edward Coke, that an A. to the English court was answerable for any contract which was good according to the law of nations. The full exemption of an A. from legal process in civil cases was first recognized by 7 Anne, c. 12, a statute whose history is thus related by Blackstone: "In the reign of Queen Anne, an A. from Peter the Great, Czar of Muscovy, was actually arrested, and taken out of his coach in London, for a debt of £50, which he had there contracted. Instead of applying to be discharged upon his privilege, he gave bail to the action, and the next day complained to the queen. The persons who were concerned in the arrest were examined before the privy council (of which the lord chief-justice Holt was at the same time sworn a member), and seventeen were committed to prison, most of whom were prosecuted by information in the court of Queen's Bench, at the suit of the attorney-general; and at their trial before the lord chief-justice, were convicted of the facts by the jury; reserving the question of law, how far those facts were criminal, to be afterwards argued before the judges, which question was never determined. In the mean time the czar resented this affront very highly, and demanded that the sheriff of Middlesex, and all others concerned in the arrest, should be punished with instant death. But the queen (to the amazement of that despotic court) directed her secretary to inform him, *that she could inflict no punishment upon any of the meanest of her subjects, unless warranted by the law of the land; and therefore was persuaded that he would not insist upon impossibilities.* To satisfy, however, the clamors of the foreign ministers, who made it a common cause, as well as to appease the wrath of Peter, a bill was brought into parliament, and afterwards passed into a law (the 7th Anne, c. 12), to prevent and punish such outrageous insolence for the future; and with a copy of this act elegantly engrossed and illuminated, accompanied by a letter from the queen, an A. extraordinary was commissioned to appear at Moscow, who declared, *that though her majesty could not inflict such a punishment as was required, because of the defect in that particular of the former established constitutions of her kingdom, yet, with the unanimous consent of the parliament, she had caused a new act to be passed, to serve as a law for the future.*" "This humiliating step," says Blackstone, "was accepted as a full satisfaction by the czar; and the offenders, at his request, were discharged from all further prosecution."

But although an A. is not amenable to any tribunal of the country he resides in, he cannot misconduct himself with impunity. He must respect the laws and customs of the country in which he is officially resident; and if he violates or offends these laws and customs, he may be complained of to the court or government which he represents; or if the offense is of a very serious nature, his recall may be demanded, or the sovereign to whom he has given such offense may dismiss him peremptorily, and further require that he be brought to trial in his own country. It hardly need be added that if an A. is guilty of an offense which threatens the safety of the state, he ceases to enjoy the privileges of the exemption in question.

There are some other and inferior privileges which are very generally allowed to ambassadors: they are, for instance, permitted the free exercise of their religion; they are, in general, exempted from direct taxation, they have special letter-bags, and they are usually allowed to import their goods without paying any custom-house duties—a privilege, however, which, being liable to abuse, has sometimes been limited.

Ambassadors are of two kinds—first, those who reside regularly at the court to which they are accredited; and, secondly, those who are sent on special occasions, when they receive the designation of AMBASSADORS EXTRAORDINARY. The employment of permanent ambassadors originated in modern times. The English diplomatic corps includes only five ambassadors in the more restricted sense of the word, who are accredited to the courts of Vienna, Paris, St. Petersburg, Constantinople, and Berlin respectively. Inferior diplomatic agents receive the title of chargé d'affaires, minister plenipotentiary, or envoy (q.v.). The United States sent only ministers plenipotentiary to foreign countries until 1893. See DIPLOMACY.

AMBA'TO, or **ASIENTO D'AMBATO**, a t. of Ecuador, on the north-eastern slope of Chimborazo, 78 m. s. from Quito, 8859 ft. above the sea. It was destroyed in 1698 by an eruption of Cotopaxi, but was soon rebuilt, and became more flourishing than before. It carries on an active trade in grain, sugar, and cochineal, the products of the surrounding country. Pop. 13,000.

AMBER, a substance analogous to the vegetable resins, and, in all probability, derived from an extinct coniferous tree, although now appearing, like coal, in connection with beds of which it is usually found, as a product of the mineral kingdom. It is usually of a pale-yellow color, sometimes reddish or brownish, is sometimes transparent, sometimes almost opaque. It occurs in round irregular lumps, grains, or drops; has a perfectly conchoidal fracture, is slightly brittle, emits an agreeable odor when rubbed, melts at 550° F., and burns with a bright flame and pleasant smell. It becomes negatively electric by friction, and possesses this property in a high degree—which, indeed, was first observed in it, and the term electricity is derived from *elektron*, the Greek name of A. The specific gravity of A. is 1.0–1.1. It is ultimately composed of carbon 79, hydrogen 10.5 and oxygen 10.5. An acid called succinic acid (named from the Lat.

succinum, amber) is obtained from it. A. had formerly a high reputation as a medicine, but the virtues ascribed to it were almost entirely imaginary. An antispasmodic volatile oil is obtained from it by distillation. A. is employed in the arts for the manufacture of many ornamental articles, and for the preparation of a kind of varnish. Great quantities are consumed in Mohammedan worship at Mecca, and it is in great demand throughout the east. It was obtained by the ancients from the coasts of the Baltic sea, where it is still found, especially between Königsberg and Memel, in greater abundance than anywhere else in the world. It is there partly cast up by the sea, partly obtained by means of nets, and partly dug out of a bed of bituminous wood. It is found elsewhere also in coal, and occasionally in diluvial deposits, as in the gravel near London; but it is very rare in Britain. It is obtained in small quantities from the coasts of Sicily and the Adriatic, and is found in different parts of Europe, in Siberia, Greenland, etc. It sometimes incloses insects of species which no longer exist. Leaves have also been found inclosed in it. Specimens which contain insects or leaves being much valued, fictitious ones are often manufactured and imposed upon collectors. According to an ancient fable, A. is the tears of the sisters of Phaëthon, who, after his death, were changed into poplars. The ancients set an immense value upon it. Pieces of A. have occasionally been found of 12 or 13 lbs. weight, but such pieces are extremely rare.

AMBER, a decayed city in the Rajpoot state of Jeypoor, India, 4 m. n. by e. from Jeypoor, in 26° 59' n. lat., and 75° 58' e. long. It is situated on the margin of a small lake, in a deep hollow among hills; and its temples, houses, and streets are scattered among numerous ravines opening on the lake. Comparatively few of its houses are now inhabited; but everywhere are to be seen ghastly Hindu ascetics, sitting amidst the tombs and ruined houses.

AMBERG, the old capital of the upper Palatinate in Bavaria, 35 m. e. of Nürnberg, and 32 n. of Ratisbon. It is situated on both sides of the Vilz, and is well built. Pop. '90, 19,126. The ancient walls are now transformed into shady avenues. A. is the seat of the court of appeal for the district, possesses a library of 34,000 volumes, a lyceum, an agricultural and industrial school, a house of correction, an arsenal, etc. The principal products are fire-arms, earthenware, woolen cloths, ironmongery, and beer.

AMBERGRIS (i.e., gray amber), a fatty substance, of an ash-gray color, with yellow or reddish striæ, like those of marble, which is found in lumps of from $\frac{1}{2}$ oz. in weight to 100 lbs. and upwards, floating on the sea, or cast upon the sea-shore in different parts of the world, and is also taken by whale-fishers from the bowels of the spermaceti whale (*Physeter macrocephalus*). Much A. is obtained from the coasts of the Bahama islands; it is also brought from different parts of the E. Indies, and the coasts of Africa and Brazil. It is probable that all of it is produced by the spermaceti whale, and that it is a morbid secretion in the intestinal canal of that animal, derived from the bile. It is highly valued upon account of its agreeable smell, and is much used in perfumery. The price is about 20s. an ounce. It has been strongly recommended for medicinal uses, but is scarcely employed in Europe; although, in some parts of Asia and Africa, it is much used as a medicine, and also in cookery as a condiment. The specific gravity of A. is scarcely more than 0.8. It almost always contains black spots, which appear to be caused by the presence of beaks of the *Sepia octopodia*, the principal food of the spermaceti whale. It consists in great part (85 per cent) of a peculiar brilliant white crystalline substance called *Ambrein*, which is obtained from it by treating it with alcohol.

AMBIORIX, a Belgo-Gallic chief who fought against Julius Cæsar about 54 B.C. By cunning and strategy he defeated one important Roman garrison, and massacred every man; but while on the march to another camp he encountered Cæsar himself, who easily defeated him, though A. with a few men escaped into the forests.

AMBLYCHILA, an American beetle of the Cicindelidæ family, found in the Pacific states and as far e. as Kansas. It has the third joint of the maxillary palpi longer than the fourth, and the first joint of the labial palpi very short, while the epipleuræ are wide. It appears only in the evening and at night, except on cloudy and rather warm days. During rain or cold it remains concealed. It feeds on insects and sometimes on excrementitious matter. The type of the genus is the *A. cylindriciformis*.

AMBLYOPIA (Gk., "dulness of sight"), a name given to the milder forms of **AMAUROSIS** (q. v.).

AMBLYOPSIS, a genus of blind fishes of which one species is found in the Mammoth cave, Kentucky. Eyes exist, but they are in a rudimentary state and under the epidermis. The A. is small, the largest no more than 5 in. long; body white and partly covered with scales; easily taken by a net or by the hand if perfect silence is observed, but they have most acute hearing. They feed on crayfish and other fishes. The nearest kindred are the minnow and pickerel.

AMBO (Lat.), a kind of reading-desk or pulpit, which, in early churches, was placed in the choir. The gospels and epistles were read from the A., and sermons were sometimes preached from it, although the more usual practice in the primitive church was for the preacher to stand on the steps in front of the altar. The A. is still to be found in oriental churches, and specimens of it may be seen in Rome. The A. has two

ascents, one from the e., and the other from the w. In the Roman churches, there were two ambos, one on each side of the choir, from one of which the gospel was read, and from the other, the epistle. Where two such ambos were used, their construction was somewhat different. The name A. was also given to the analogium or reading-desk used in monastic choirs, which was usually in the form of an eagle.

AMBOISE, a t. on the left bank of the Loire, in the department of Indre-et-Loire, France. It is 15 m. by railway e. of Tours, and lies in a region so rich in vineyards, that it has been called "the garden of France." Its manufactures are unimportant. A. possesses a castle, in which several of the French kings have resided. Charles VIII. was born here. It was also the scene of his death. The town is memorable as the place in which the religious wars that devastated the kingdom during the 16th c. broke out, and where the word "Huguenot" was first applied to the Protestant party. The castle of A. was much improved by Louis Philippe, and was the residence of the Arab chief, Abd-el-Kader, during his captivity in France. Pop. nearly 5000.

AMBOISE, GEORGE D', cardinal and prime minister under Louis XII. of France, was b., 1460, at Chaumont-sur-Loire. When only 14 years old he was made bishop of Montauban, and almoner to Louis XI., and, in 1493, was made archbishop of Rouen. Initiated in early years into the intrigues of court, he soon, by his zealous services, secured the confidence of Louis of Orleans (Louis XII.), by whom he was made premier in 1498. From this time A. became the prime mover in all the political affairs of France. By his advice the king undertook the capture of Milan, which had such great influence on the fortunes of France. After the death of pope Alexander VI., A. endeavored to raise himself to the papal see, and having failed became the dangerous enemy of the succeeding popes, Pius III.—who occupied the papal chair only 27 days—and Julius II. To secure his own election, A. encouraged a schism between the French church and the see of Rome, and convened a separate council, held first at Pisa, afterwards at Milan and Lyons; but his plans were frustrated by the failures of the French army in Italy. He died at Lyons, May 25, 1510. The cardinal A. was a dexterous and experienced statesman; but was accused of avarice, vanity, and ambition, and it was said that his vast fortune of 11,000,000 livres had not been accumulated by over-scrupulous means. His biography was written by Montaigne (1631) and Legendre (Rouen, 1724).

AMBOY, a t. in Lee co., Ill., on the Illinois Central, and Chicago, Burlington, and Quincy railroads, 94 m. w. of Chicago. It has manufactures, mills, grain elevators, repair shops, banking facilities, churches, public schools, and newspapers. Pop. '90, 2257.

AMBOY'NA, APON, or THAU, the most important of the Spice islands belonging to the Dutch, lies s.w. from Ceram, and n.w. from Banda, in 127° 51' 30"—128° 22' 15" e. long., and 3° 26' 40"—3° 49' s. lat. Area, 264 sq. m. The bay of A. runs into the island lengthways, forming two peninsulas, the northern called Hitu, and the southern, which is the smallest, Leitimor. A. is mountainous, the highest peaks being in Hitu. The climate is healthy; average temperature, 82° F.; lowest, 72°. The e. monsoon brings heavy rains and storms. There are many rapid streams, and the t. of A. is supplied with excellent water from three small rivers. Clove, sago, mango, and cocoanut trees are abundant, also fine timber for cabinet work. The sago palm grows along the shores. The hills are covered with the cajepout or leucadendron, from the leaves of which a medicinal oil is extracted. Sweet potatoes, coffee, pepper, indigo, rice, and fruits are grown. Fish is plentiful, and on the shores of A. beautiful shells are found. Deer are numerous on Hitu. There are hogs and goats, a few sheep, monkeys, civet-cats, anteaters, crocodiles, snakes, etc. Buffaloes, horned cattle, and horses are imported. The natives are generally civilized, though still very superstitious. They speak a Malay dialect, and observe customs which indicate a Hindoo origin. Daughters are a source of wealth, a payment of jewels, slaves, or clothing being exacted from the bridegroom. The Dutch have employed harsh measures in dealing with the natives, setting apart the *villagers* for the clove cultivation, and holding them in feudal service during half the year; while the *freemen* were allowed to follow handicrafts, grow fruits and vegetables, fish, make fragrant oils, and trade. The trade, which is small, is chiefly carried on by Chinese and Arabs. Pop. about 238,000, of whom about 2,100 are Europeans. The Dutch took A. from the Portuguese in 1605. A British settlement was made here about 1615, but the inhabitants were massacred by the Dutch in 1623. Cromwell exacted an indemnity for this in 1654. The British held the island 1796–1802, and seized it again in 1810, but in 1814 the Dutch became permanent possessors.

AMBOYNA, the capital, is situated near the middle of the n.w. shore of Leitimor, on the bay of A., in 3° 41' 40" s. lat., and 128° 15' e. long. A wooden pier, where ships lie in 20 fathoms, leads to the town through Fort Victoria, within which the government buildings are situated. The town has a good roadstead and is well built. The streets are wide and clean; many houses are shaded by nutmeg trees. Since 1854 A. has been a free port.

AMBRACIA, or **AMPRACIA**, a city of ancient Epirus, on the e. bank of the river Arachthus, 7 m. from the Ambracian gulf. About 635 B.C. it was colonized by Corinthians, and became a Greek city. Its power increased until, in the time of the Peloponnesian war, it commanded the whole of Amphilochia, including the city of Argos. In 432 B.C. the expelled Argosians drove out the Ambracians and retook their city. The Ambracians made two unsuccessful efforts to recapture Argos, but their power was declining, and in 338 the old city submitted to Philip of Macedon. About 295 B.C. Ambracia was ceded to Pyrrhus of Epirus, who made it his capital and enriched it with works of art. At a later period it came under the power of the Ætolian league, and in the year 189 B.C. it sustained a siege in the war between the Ætolians and the Romans, the latter entering the place and carrying many of the treasures of art to Rome. In 31 B.C. Augustus removed the people of A. to Nicopolis, the town which he founded in honor of his victory at Actium. The site of A. is now occupied by the town of Arta, near which ruins of the old city can be seen.

AMBROS, **AUGUST WILHELM**, 1816-76; b. Bohemia; an eminent pianist, composer, musical critic, and historian. His *History of Music*, on which he was engaged from 1860 until his death, and which was left unfinished with the 4th vol., is a masterly work. His compositions include pianoforte pieces, songs, 2 masses, etc.

AMBROSE, **SAINT**, one of the most celebrated of the ancient fathers of the church, was b. about the year 340, probably at Treves, where his father, as prefect of Gaul, was wont to reside. A. received a fortunate omen even in his cradle: a swarm of bees covered the slumbering boy; and the astonished nurse saw that the bees clustered round his mouth, without doing him any harm. His father, perhaps remembering a similar wonder related of Plato, foreboded from this a high destiny for A. He received an excellent education, and went with his brother Satyrus to Milan, in order to follow the legal profession. He soon distinguished himself so much, that, 369, he was appointed under Valentinian, prefect of upper Italy and Milan. In this office, his gentleness and wisdom won for him the esteem and love of the people, whose prosperity had been much injured by the troubles caused by Arianism. Accordingly, by both Arians and Catholics, he was unanimously called to be bishop of Milan, in 374. A. long refused to accept this dignity, and even left the city; yet he soon returned, was baptized, as hitherto he had been only a catechumen, and was consecrated eight days afterwards. The anniversary of this event is still celebrated as a fête by the Catholic church. As a bishop, A. won the universal reverence of all, by his mild and gentle, though, towards wickedness of every kind, severe and unbending character. Thus, he repulsed the emperor Theodosius himself even from the door of the church, on account of his having caused the rebellious Thessalonians to be cruelly massacred by Rufinus, excommunicated him, and only restored him to the church after eight months of severe penance. A. d. in 397. The best edition of his works, in which he followed in many things the Greek theological writers, is that published by the Benedictines (2 vols., Paris, 1686-1690). The hymn, *Te Deum Laudamus*, is usually ascribed to A., but it is proved to have been written 100 years later. The Ambrosian ritual has also received his name, only because A. had made some changes upon it, which are retained at the present day in the Milanese church. A commentary on the epistles of Paul, which was formerly ascribed to A., was probably composed by the Roman deacon Hilarius, and is usually quoted as the commentary of the Ambrosiaster. A. is the patron saint of Milan, and the Ambrosian library received its name in honor of him.

AMBROSIA, in Greek and Roman mythology, is the name of the food of the gods, which conferred immortal youth and beauty. It was brought by doves to Jupiter, and was occasionally bestowed upon such human beings as were the peculiar favorites of the gods. A. was also used as a fragrant salve, which the goddesses employed to heighten their beauty; with which Jupiter himself anointed his locks; and which had the property of preserving bodies from corruption. Hindu mythology has also its *amrita* (from *a*, signifying "without" or "not," and the Sanscrit root, allied to the Lat. *mort*, and Greek *brot*), or liquor of immortality, that resulted from the churning of the ocean by the gods; and the gods of the Scandinavian pantheon were preserved in perpetual vigor by eating the apples guarded by Idun.

AMBROSIAN CHANT, the choral music of the early Christian church, introduced from the eastern church into the western by St. Ambrose, bishop of Milan, in the 4th c.; it was founded on the first four authentic modes of the ancient Greeks, and was sung antiphonally. It continued in use until the 6th c., when Pope Gregory the Great reformed the music of the church by introducing the Gregorian chant. There exists still another specimen of music by Ambrosius, which is now known only in the German-Lutheran church by Luther's translation of the words, *Nun kommt der Heiden Heiland*; it is beyond a doubt 1400 years old, and remains to this day a beautiful specimen of melody, expressive of filial humility and submission. The A. C. continued to be still sung in the cathedral at Milan long after Gregory's reformation, and till this day, it is said, it may be heard there.

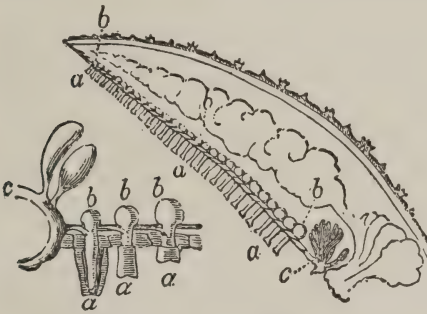
AMBROSIAN LIBRARY, a library in Milan, so named in honor of St. Ambrose, the patron saint of that city. It was established in 1609 by the cardinal archbishop Federigo Borromeo, who employed learned men to collect books both in Europe and Asia. This

library was afterwards enriched by the acquisition of the MSS. of the Pinelli collection. Among the many rarities belonging to it, besides the palimpsests and other as yet unedited MSS. discovered by Maio, Castiglione, and Mazzuchelli, it contains a "Virgil," in which Petrarch had written an account of his first meeting with Laura.

AMBROSIUS, JOHANNA, author; b. in Lengwethen, Prussia, Aug. 3, 1854; daughter of a poor mechanic; received a village school education. She married a peasant in her twentieth year, and led a life of poverty and the hardest toil, but found time to write poems for the magazines. Her poems were first collected and published in 1894, and have since passed through many editions, attracting high praise for the genuine literary talent they display.

AMBROTYPE is a name given to a particular form of daguerreotype, differing from the original daguerreotype in that it is taken on glass instead of the metallic plate used by Daguerre. See **DAGUERRETYPE**; **PHOTOGRAPH**.

AMBRY, AUMERY, or ALMERY (supposed by some to be a corruption of Almonry), a niche in the wall of a church, shut in by a door; or a small cabinet of wood placed by the side of the altar, for the purpose of holding the vestments and utensils, such as the chalices, basins, cruets, etc., used for the service of the mass. In monastic buildings, ambries were used for various purposes, such as keeping plate, hanging towels for the monks to dry their hands with before dinner, and the like. In this sense, the term *A.* seems to have been applied to any kind of cupboard which was closed in and locked, and it is so used in Scotland at the present day.



AMBULACRA OF STAR-FISH,

As seen in a longitudinal and vertical section of one of the rays; and three of them in a separate figure on a larger scale, in which they are shown in different conditions: *a, a, a*, tubular feet; *b, b, b*, internal vesicles; *c*, the organ which supplies the fluid with which they are filled.

AMBULACRA (from the Latin *ambulare*, to walk), the name given to peculiar organs of locomotion with which starfishes and other *echinodermata* are furnished. They are fleshy, more or less elongated, and terminated by suckers. They pass through orifices in the shell or other external integument of the animal, and are generally arranged in rows. Those of the *echini*, or sea-urchins, are long enough to extend beyond the point of the spines, and by means of them the animal is able to climb a perpendicular rock. They are tubular, and each has at its base a vesicle, filled with a fluid which, on the contraction of the vesicle, is forced into the tube, dilating it to its full extent, whilst, on the contraction of the tube, the fluid returns again into the vesicle. The fluid is not secreted by these vesicles, but provided for them by distinct secreting organs.

AMBULANCE, a two or four-wheeled wagon constructed for conveying sick or wounded persons. Ambulance-wagons are constructed to run very easily, and are designed to carry one or two tiers of stretchers. Some forms are fitted with water-tank, medicine-chest, operating-table, and other conveniences. City hospital ambulances are light, four-wheeled wagons furnished with one or two beds, surgical appliances, restoratives, and so forth. There is a surgeon who rides in the ambulance, and in the crowded streets a gong is kept sounding in order that the ambulance can have the road cleared. In the army the term is usually confined to small spring-wagons, provided with all the necessary appliances for care of the sick or wounded. In each division of the army these wagons are organized into a corps, and placed under the command of an ambulance officer. Railway cars and steamers are also fitted up with conveniences for transporting patients to more remote and permanent hospitals. The system perfected in this country during the civil war, has now been adopted by most of the civilized nations. Several of the continental countries keep permanently in store railway trains completely equipped for hospital service. In France an ambulance is a portable hospital, one of which is attached to every division of an army in the field, and provided with all the requisites for the medical succor of sick and wounded troops. Such an ambulance is stationed at some spot removed from immediate danger, and soldiers are sedulously employed after a battle in seeking out those who have been wounded, and conveying them to the ambulance. The French also introduced the *cacolets*, which consist of two easy-chairs slung in panniers across the back of a mule, which are available along paths where no wheel-carriage could pass. The *cacolets* have since been adopted by other armies, as well as improved hand-litters and wheeled-litters or barrows.

AMBULATORY. A name occasionally given in architecture to the cloisters of a cathedral, college, or the like.

AMBUSCADE is one of the manœuvres adopted in war. The original Italian, *imboscata* ("concealed in a wood"), denotes the general nature of the *A.*; but the meaning is now much more extended, seeing that it implies to any attempt to attack an enemy by

lying in wait and coming upon him unexpectedly. In former days, when soldiers fought hand to hand more frequently than at present, the A. was much resorted to; but the tactics of modern times render it less available. It was by an A. on the part of the revolted sepoy that so many British soldiers were killed and wounded in that adventure which was known, during the wars of the Indian mutiny, as the "disaster at Arrah," in July, 1857. An A. is neither an "attack" nor a "surprise," in military language; it is something more sudden and unexpected than either.—**AMBUSH** is another name for ambuscade.

AMEER. See **EMIR**.

AMELANCHIER, a genus of plants of the natural order *Rosaceæ* (q.v.), sub-order *Pomeæ*, distinguished by having five ovaries, each of which is divided into two cells, with one ovule in each cell, the ripe fruit including 3 to 5 carpels. It consists of a few species of small trees with deciduous simple leaves, abundant racemes of white flowers, and small fruit of the size of a pea, or a little larger, but soft, juicy, and agreeable. The common A. (*A. vulgaris*) is a native of the Alps, Pyrenees, etc. The other species are natives of N. America. *A. botryapium* is sometimes called June-berry, from its fruit ripening in June, before that of any other tree or shrub; and *A. ovalis* produces a very pleasant fruit, which makes excellent puddings. The amelanchiers are planted in Britain merely as ornamental trees. They are very hardy.

AMELIA, a co. in central Virginia, almost surrounded by the Appomattox river; 380 sq. m. Population, '90, 9068, including colored. It is intersected by the Southern railroad. The principal productions are wheat, corn, oats, and tobacco. Co. seat, Amelia.

AMELIA (anc., *Ameria*), a t. of central Italy, in the province of Perugia, 21 m. s.w. of Spoleto. It is picturesquely situated on the mountains between the Nera and the Tiber, about 7 m. from the junction of the two rivers. It is the seat of a bishop, and has a cathedral. Pop. of commune, nearly 9000.

AMELOT DE LA HOUSSEY, ABRAHAM NICOLAS, 1634–1706; a French historian; a prisoner in the bastille by order of Louis XIV. He published *History of the Government of Venice*, translations of Macchiavelli's *Prince*, and Tacitus's *Annals*, and of Sarpi's *History of the Council of Trent*, the notes of which, written by A., gave great offense to the advocates of the unlimited authority of the pope. Voltaire speaks of his histories as very good, and of his memoirs as very faulty.

AMELOTTE, DENIS, 1606–78; a French ecclesiastic and writer; member of the congregation of the oratory of St. Philip Neri. He is remembered for his quarrels with the Port Royalists, and his fierce denunciation of the Jansenists. A. published a translation of the New Testament in 1666–68.

AMEN', a Hebrew word of asseveration, is equivocal to "yea," "truly," and has been commonly adopted in the forms of Christian worship. In Jewish synagogues, the A. is pronounced by the congregation at the conclusion of the benediction given at parting. Among the early Christians, the prayer offered by the presbyter was concluded by the word A., uttered by the congregation. Mention is made of the practice in the 1st epistle to the Corinthians (xiv. 16). Justin Martyr is the earliest of the fathers who alludes to the use of the response. In speaking of the sacrament, he says that at the close of the benediction and prayer, all the assembly respond "A." According to Tertullian, none but the faithful were allowed to join in the response. A somewhat noisy and irreverent practice prevailed in the celebration of the Lord's supper until the 6th c., after which it was discontinued. "Upon the reception both of the bread and of the wine, each person uttered a loud 'A.' and at the close of the consecration by the priest, all joined in shouting a loud 'A.'" The same custom was observed at baptism, where the sponsors and witnesses responded vehemently. In the Greek church, the A. was pronounced after the name of each person of the Trinity; and at the close of the baptismal formula, the people responded. At the conclusion of prayer, it signifies (according to the English church catechism) *so be it*; after the repetition of the creed, *so is it*.

AMENDE HONORABLE, formerly an infamous punishment in France, to which criminals who offended against public decency or morality were condemned. The simple *Amende honorable* consisted of a confession in open court made by a bare-headed and kneeling criminal. The *Amende honorable in figuris* was made by a culprit, who, kneeling in his shirt, with a torch in his hand and a rope around his neck (begged pardon of God and of the court). In popular language, the phrase now denotes a public recantation and reparation to an injured party for improper language or treatment.

AMENDMENT is a term used both in judicial and parliamentary proceedings. In the former, it is a power of correction of any errors in actions, suits, or prosecutions, which has been greatly extended of late, and which has largely improved and simplified the administration of the law, both in England and in America. In parliament, the word A. is used when it is intended to oppose, vary, or qualify a question or resolution; and in the case of bills, it is employed as a courteous method of dismissing the bill from any

further consideration, by moving that instead of "now," it be read at the end of three months, six months, or any other term beyond the probable duration of the session. It is also competent to a member to move as an A. to the question a resolution declaratory of some principle adverse to that of the bill, provided it be strictly relevant, as was done successfully, in 1859, by Lord John Russell, when he moved and carried, as an A. to the motion for the second reading of the reform bill of Lord Derby's government, a resolution declaratory of a principle which the supporters of that measure considered to be subversive of it.

An amendment to the constitution of the United States is proposed by the affirmative vote of two-thirds of each house of congress, and then it must be submitted to the states, when, if three-fourths of all the states by vote in the legislature (or in state convention if required by congress) ratify such amendment, it becomes a part of the constitution. Or, on the application of the legislatures of two-thirds of the several states, congress shall call a convention for proposing amendments; but this mode has never been resorted to. There is one restriction only on the nature of amendments, which is "that no state without its consent shall be deprived of its equal suffrage in the senate."

AMENO'PHIS, AM'UNOPH, or AMEN-HOTEP, the name of three Egyptian kings of the 18th dynasty. A. I. was the second of them. He continued the conquests begun by his predecessor in Canaan, and made an expedition toward Ethiopia to extend the boundary of his kingdom. He reigned in the latter half of the 17th century B.C.

AMENO'PHIS II., King of Egypt, son and successor of Thothmes III., and father of Thothmes IV.; identified by some writers with Memnon, who fought against the Greeks at Troy; reigned in the latter half of the 16th century B.C.

AMENO'PHIS III., King of Egypt, son of Thothmes IV. He reigned in the beginning of the 15th century B.C., and made Egypt prosperous and contented, extending the kingdom over more territory than ever before or afterwards, as it reached from the w. bank of the Euphrates into Ethiopia. There are many monuments of his period, the most famous being the two colossi, one of which is known as "the vocal Memnon." Some writers supposed this king to be the one whom the Greeks called Memnon. His exploits in war are commemorated on the obelisk which, transported from Egypt, now stands in the Place de la Concorde in Paris.

AMENORRHEA, the suspension from any cause other than pregnancy of the catamenial flow. (See MENSTRUATION.) It is generally an indication of functional disturbance, and is to be regarded as a symptom rather than as a malady, to be treated apart from the disorder which causes it. Amenorrhœa is at times merely an economy of nature which strives to husband the strength of a woman by diminishing the drain upon the system. It is frequently an accompaniment of *anæmia* (q.v.), and due to poverty of the blood. In this case the treatment adopted should be one tending to strengthen the general health. Nourishing and generous diet, with iron or arsenic, and with a due regard for the regulation of the bowels, will in general banish the cause of the irregularity. See EMMENAGOGUES.

AMENTA'CEE, according to some botanists, a natural order of dicotyledonous or exogenous plants, consisting entirely of trees and shrubs whose flowers are unisexual, the male flowers, and very often also the female flowers, disposed in *amenta* or CATKINS (q.v.), and the perianth either wanting or incomplete. This order, which contains many well-known and important trees, is divided into a number of sub-orders, which by many have been erected into distinct orders, forming the *amental alliance* of Lindley. Under A. are ranked *salicinea* or *salicaceæ* (see WILLOW), *myriceæ* (see CANDLEBERRY MYRTLE), *casuarinaceæ* (see CASUARINA), *betulaceæ* (see BIRCH), *alingiaceæ*, (called also *balsamaceæ*, but not to be confounded with *balsaminaceæ*, or *balsamineæ* (see LIQUIDAMBAR); by some also *corylaceæ* or *cupulifereæ* (q.v.), and *platanæ* (see PLANE), both of which Lindley excludes from his amental alliance, associating the former with *juglandaceæ* (see WALNUT), as a distinct *alliance*, and referring the latter to the *urtical alliance*. See URTICACEÆ. On the other hand, he unites with the amental alliance the order *elaagnaceæ*. See ELÆAGNUS.

AMEN'THES, an Egyptian mythological word equivalent in meaning to the Greek word *hades*, the unseen world. Plutarch explained it as signifying "the giving and taking," an interpretation generally adopted, but erroneously. A. literally means "the hiding" (-place understood). On Egyptian monuments we find the god Anubis leading to A. the souls which, in the form of birds, are escaping from the body through the mouth. He conducts them before the throne of Osiris, who sits as judge, with a council or jury of forty-two persons. The female deity, AMENT, represented on monuments in upper Egypt, is merely a female form of Ammon, and her name has no connection with that of A.

AM'ERBACH, JOHANN, d. about 1513; a German printer, educated in Paris. He established a press at Basel, publishing the works of St. Ambrose and St. Augustine, and began to publish those of Jerome. He was one of the first to use Roman in place of Gothic letters. His son Boniface was an intimate friend of Erasmus.

AMERICA, one of the four quarters of the globe; being smaller than Asia, but larger, perhaps, than both Europe and Africa taken together. It is the only one of the four main divisions of the land that is washed by all the four great oceans—the Northern, the Atlantic, the Southern, and the Pacific.

If Terra del Fuego and Greenland are included—as ought to be done on geological grounds—A. occupies about 150° of long., and about 135° of lat. Speaking generally, its extreme length may be said to be on a meridian, and its extreme breadth on a parallel—facts which, in the light of analogy, look more like a law than an accident. As the map will show, similar coincidences occur in South A. by itself; in Africa, in Europe, in Asia, and in Australia. As between Asia and A., moreover, it deserves to be noticed that the meridional semicircles, along which run their respective lengths, form, with an interval of 180° , one and the same meridional circle.

Like the old continent, A. has been divided by nature into two peninsulas—Daríen and Suez being the isthmuses, while South A. corresponds with Africa, and North A. with Asia and Europe. Even to this extent, however, the resemblance is by no means close. In the new world, the whole of the lower peninsula is to the s. of the whole of the upper one, while Asia overlaps half the latitude, and more than half the magnitude, of Africa.

Of the northern half of A., the southern section, on account of essential differences in character and appearance, is in general contemplated by itself under the name of Central A.—the most convenient limit, perhaps, being a line drawn from the mouth of Rio Bravo del Norte to the lower end of peninsular California; and this line, besides its geographical propriety on both coasts, has the recommendation of marking, on the nearer coast, the international boundary of the United States and Mexico. *Central A.*, it is to be observed, has a political signification as well as a physical one, comprising, in the former sense, the comparatively small states between Mexico and New Granada—Guatemala, Honduras, San Salvador, Costa Rica, and Nicaragua.

Physically, however, these three subdivisions of A. may be regarded as one, being knit together on the w. side by a backbone, as it were, of mountains, which, under various names and various aspects, stretches from the extreme s. at cape Horn to nearly the extreme n. at the mouth of the Mackenzie. To this mountain-system we shall have occasion to refer under the distinct heads of *ANDES*, *CORDILLERAS OF CENTRAL A.*, and *ROCKY MOUNTAINS*, restricting ourselves at present, in accordance with the general aim of this article, to such features of the entire chain as may incidentally come under our notice in connection with earthquakes, volcanoes, climate, or hydrography; and with regard to this article generally, the subject being A. as a whole, we shall, as seldom and as little as possible, anticipate details, which, even if anticipated here, must still be repeated under the respective heads of their proper localities.

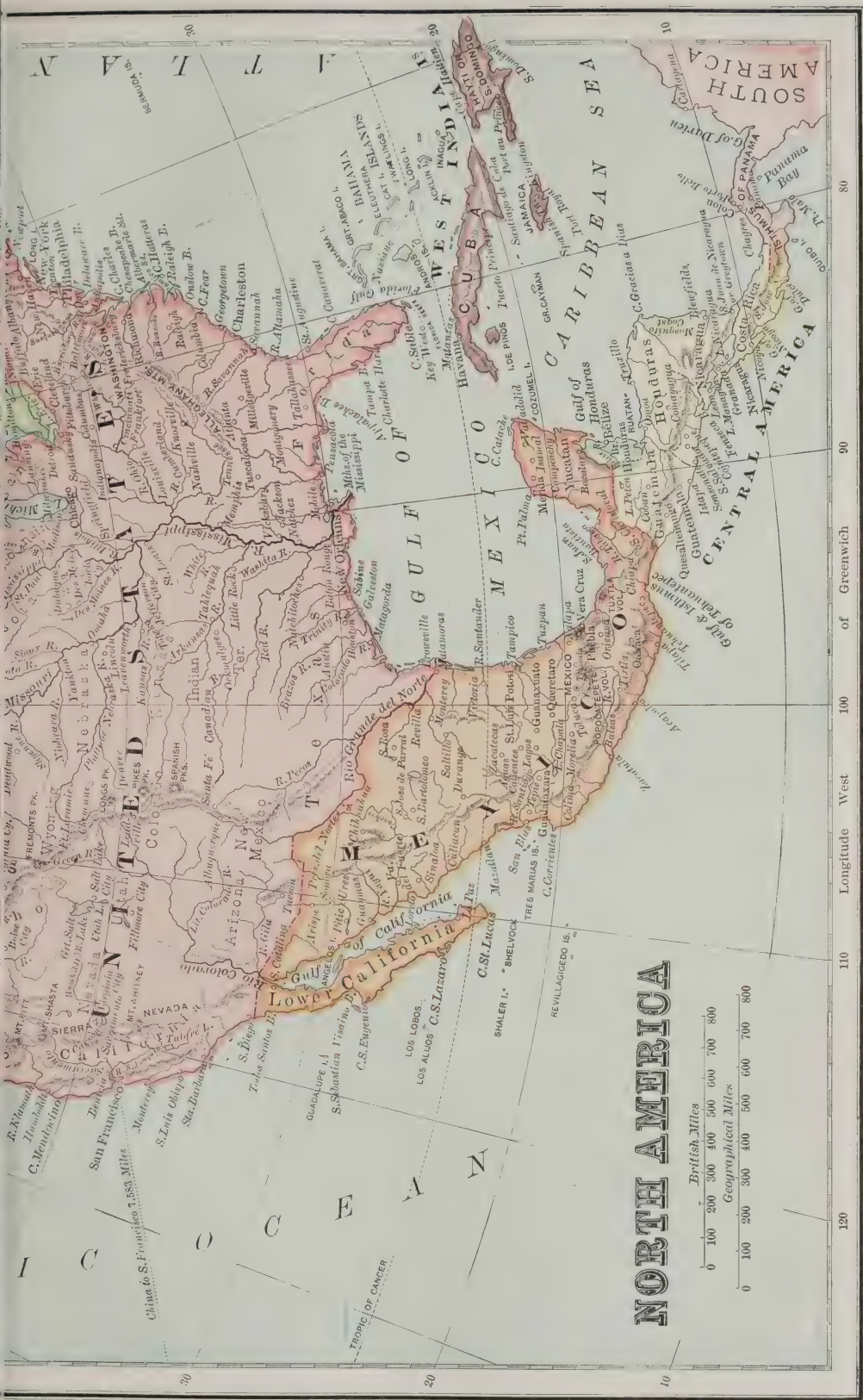
In thus treating of A., we shall consider separately its *earthquakes and volcanoes*, its *climate*, its *hydrography*, its *history*—comprehending its *discovery* and its *colonization*, but excluding anything like the annals of any individual state—and, lastly, its *geology*, *botany*, and *zoology*.

The *earthquakes and volcanoes* of A. are to be found chiefly in the backbone of mountains already mentioned. In South A. they may be said to be exclusively so found, being confined to the Andes proper, that skirt the Pacific, and to the Venezuelan spur or branch of the main range. The same remark may be applied to Central A. But in North A., the energy which produces both classes of phenomena appears to have followed rather the coast than the continuous chain which diverges gradually from it—earthquakes being often felt in the maritime towns of upper California, and volcanoes having left their traces behind them on the islands of Alaska. The agency in question seems to have traveled from n. to s. along the coast, having exhausted itself in its more ancient seats; and this view derives support from the obvious formation of the Sandwich Islands, which are as nearly as possible parallel with the w. coast of A., between Behring's strait and the equator. On this interesting subject we quote from Sir George Simpson's *Overland Journey*: "The whole group appears to have been thrown up from the deep by volcanic action advancing from the n.w. to the s.e., and increasing in force as it advanced; so that, while island rose after island, each grew at once in height and in breadth according to the intensity of the power that heaved it upwards from the waters. Thus Bird island, a barren rock taking its name from its only inhabitants, must be considered as the germ of the archipelago, as the first fruits of a submarine energy that was here only kindling its fires; while the other links in the chain, Kauai, Woahoo, Mowee, and Hawaii, not only differ, as I have just mentioned, at once in extent and in elevation, out also present, as they proceed, less and less evidence of antiquity in their gradually diminishing proportions of land capable of cultivation—a proof the more conclusive, inasmuch as the soil of the whole group undeniably consists of the successive gifts of years and ages and centuries. Moreover, the visible laboratories of the subterranean fire, which are scattered over the archipelago, confirm the same view; the craters are all extinct, excepting on Hawaii; and even on Hawaii, Mouna Loa, the most south-easterly of its three great safety-valves, alone bears living testimony to the creative impulse that has called the whole chain into existence, and bears it, too, only through its lateral advance of subsidiary outlets down its eastern declivities, to be rolling the hidden sources of its strength—peradventure there to forge fresh islands—under the bed of the ocean."

Climate.—In comparing A. with the older continent, we must contrast not e. and w. with each other, but w. with w., and e. with e.—neither Newfoundland with England,

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nor British Columbia with Kamtchatka, but Kamtchatka with Newfoundland, and England with British Columbia. Such a comparison shows that the difference lies not, as is often assumed, between the two continents, but between the opposite shores of either continent within itself. For instance, at Nain, in Labrador, the mean temperature is 7° F. below freezing; while at Sitka, in Alaska, it is 12° above freezing. The difference of 19° between the e. and w. coasts of the new world, is only a very little less than the difference between the e. coast of the new, and the w. coast of the old; for the temperature of Gottenburg, in Sweden, is only 21° higher than that of Nain. It is to be remarked, however, that this difference between the opposite coasts of the two continents diminishes as we proceed southwards. New York is only 7° colder than Naples; and Florida has the same temperature as Cairo.

In illustration of the contrast between the e. and w. coasts of A., we are told by the traveler already cited, that, at the mouth of the Columbia river, the first half of Dec. presented one deluge of rain after another from the s.e., this weather winding up on the 16th of the month with a storm of thunder and lightning; "while, to mark the difference of climate between the two sides of the continent, the good folks of Montreal, though occupying a lower parallel than ourselves, were sleighing it merrily through the clearest and driest of atmospheres." Nor is the difference, according to the same authority, less palpable in the old continent than in the new. "To place in the most striking light the contrast in point of climate between the opposite shores of the old continent, Kamtchatka and the British isles may be said, with sufficient accuracy for this purpose, to lie in the same latitudes, and to present the same area, and even to occupy the same position with respect to the proximity of water; and yet, while the British isles maintain a population of over 38,000,000 inhabitants, Kamtchatka, with the help of extraneous supplies, can barely prevent its population of 7500 souls from starving."

But whatever influences may be common to the climates of both continents, the climate of A. is subject to two peculiar influences—that continent's prolongation southward, and its backbone of mountains. With respect to the former point, A. advances at least 20° further southward than Africa—fully more than half the interval between the latter and antarctic ice; so that the southern breezes which, in summer, bring freshness and delight to the cape of Good Hope, waft cold and misery to cape Horn: Two of Cook's people, on his first voyage, were frozen to death in Terra del Fuego towards the end of Jan.—in a month corresponding with our July, and in a latitude the same as that of Edinburgh. The backbone of mountains, again, that other point which peculiarly influences the climate of A., does its work in two ways. Throughout almost its entire course, its height arrests the passage of the clouds and rains. Within and about the tropics, these are borne from the e. by the trades; in the more temperate regions, they are brought from the w. by the prevailing counter-currents of air. But in either case, the windward slope of the mountain barrier is a fertile garden, the leeward slope a barren desert. In the more central plateaus, again, of Quito and Mexico, the various terraces present as many climates, and bring together, under the same parallel, all the temperatures and energies of nature.

But there exist, more particularly in North A., peculiarities of climate, which cannot, perhaps, be referred to any known cause. On the opposite sides, for instance, of the great water-shed between the gulf of Mexico and Hudson's bay, antagonistic results are said to show themselves in winter. On the northern side, the climate is understood to improve as one advances westward, the Saskatchewan, though in a considerably higher latitude, opening earlier in spring than the St. Lawrence; whereas, on the southern side, ice forms in New Orleans, at the mouth of the Mississippi, strong enough to bear half-grown boys, a thing wholly unprecedented on the corresponding parallel of the Atlantic shore. Even in summer, at least on the northern side of the water-shed in question, something of a similar change of climate has been observed, for maize, which, in Quebec, is a precarious crop, even on the international line of 45° , regularly ripens, in Red river settlement, which, besides 5° more of latitude, is at least 1000 feet higher above the level of the sea.

With respect to that portion of A. which is best known, a popular misapprehension generally prevails as to the steadiness of its climate in any given season of the year. The Canadian summer, for instance, is supposed to be an unbroken period of tropical heat; and the Canadian winter to be, in its turn, an unbroken period of hyperborean cold. Now, in both directions, this is a great mistake. The summer of Canada is often tropical, and its winter often hyperborean, the extreme ranges of the thermometer, according to the experience of credible informants in localities to the s. of London, sometimes being in one and the same year, 104° F. above zero, and 52° below it. But this difference of 156° , which is measured probably by an interval of six months, is far less remarkable than the differences which a few days may bring forth. The highest range occurred within four days after parlor-fires had been given up; and the lowest fell on a day which, a year or so before, had been marked by a powerful thaw. In the city of Montreal itself, 36 hours, or less, have sometimes exhibited a difference, up or down, of 60° F. in winter; and even in summer, whether in Quebec or in the north-west one can seldom reckon on any other month than July as free from night-frosts. In such changes, the Canadian climate may be taken as a sample of the climate of North A. in general.

extreme ranges of temperature, as prevailing respectively in summer and winter, being naturally attended by more or less considerable vicissitudes in each individual season.

In the tropical regions, however, of A., whether central or southern, a singular uniformity of temperature does exist on each of the various terraces of the mountain chain. The same parallel, as has been already mentioned, presents at once the torrid, the temperate, and the frigid zones. Such a view of the matter, however, is, to a certain extent, deceptive, for in not one of the three cases are the vicissitudes of the respective zones, properly so called, found to show themselves. Each level is said to be so steady in its temperature as to enfeeble and enervate the inhabitants through the monotony even of that which is in itself good; and in such cases, the salutary prescription is to ascend or to descend, for a time, from one terrace to another.

Hydrography.—With the backbone of mountains as the principal water-shed of A., the rivers on opposite sides of the continent are still more different than the climates. Excepting in Central A., the difference in question is enormous. Even in North A., where it is less than in South A., the contrast is sufficiently striking. On the w. side of the Rocky mountains, the only streams worthy of notice besides the great Yukon are the Colorado, which flows into the head of the gulf of California; the Sacramento, which enters the harbor of San Francisco; and the Columbia, which empties itself into the open ocean—three rivers which, if compared with the waters of the opposite coast, are, in practical value, inferior singly to the Hudson, and collectively to the Rio Bravo del Norte. On the e. side, however, there exist rivers to which the Rio Bravo del Norte and the Hudson are but as brooks. To begin with the extreme n.: the Mackenzie, besides draining a large basin on its own side of the Rocky mountains, draws from beyond them two of its principal feeders, the Peace and the Liarde, burying itself, however, under the perennial ices of the Arctic ocean. Passing, without further notice, the Coppermine and the Fish river, of both which the interest is purely historical in connection with arctic discovery, we come to the Nelson, which brings down to Hudson's bay the Winnipeg and the Red river, two streams bordering respectively on the head-waters of the St. Lawrence and the Mississippi, and also the two branches of the Saskatchewan, which all but touch the sources of the Columbia and the Missouri. Next in order is that long alternation of mighty river and mightier lake—that reservoir of half the life-blood of the earth—which, under the name of the St. Lawrence, gradually becomes a sea. South of the St. Lawrence, along the coast, we meet the Atlantic streams of New Brunswick and the United States, all of them valuable beyond their magnitude, and most of them connected, more or less closely, with the Alleghanies—the St. John, the Penobscot, the Connecticut, the Hudson, the Delaware, the Susquehanna, and the Potomac. Round into the gulf of Mexico, and we reach, besides many second-rate rivers in either direction, perchance the most important stream on the face of the globe—a stream which, after uniting the Mississippi and the Missouri under the name of the former, receives on the right the Arkansas and the Red river, and on the left the Ohio, enriched, as it is, with the tributaries of the Wabash and the Tennessee.

In South A., again, the difference between east and west is still more remarkable. On the w. the Guayaquil, the only stream worth mentioning, is not to be compared even with the rivers that flow from the subordinate ranges of Brazil or Guiana; while, on the e., the Andes send down, besides the Magdalena flowing into the Caribbean sea, the Orinoco, the Amazon, and the Plata, into the open ocean, across the almost entire breadth of the continent—three networks of inland navigation, which, under the head of the Amazon (q.v.), we have already shown to be virtually one, and, beyond that, to be virtually linked with the Essequibo of British Guiana.

Nor will the disparity between the two coasts of the continent be less striking if the harbors are considered as well as rivers, the external outlets as well as internal channels. On the Pacific, South A. possesses, to the n. of Chili, only two ports entitled to the name, Panama and the Guayaquil already mentioned; while, on the same coast, North A., along a line of 3000 m. up to British Columbia, presents only five safe and convenient havens—Acapulco, Mazatlan, Magdalena bay, San Diego, and San Francisco. But the Atlantic side presents a contrast to which no language can do justice. To take the divisions as they come: Newfoundland has its St. John's, Cape Breton its Louisburg, Nova Scotia its Halifax, New Brunswick its St. Andrews, Maine its Portland, New Hampshire its Portsmouth, Massachusetts its Boston, Connecticut its New Haven, Rhode Island its Newport, and so on. Nor is this all. While fully a third part of the rivers of Europe and Asia are lost to the commerce of the world at large in the frozen seas of the north, or in such landlocked pools as the Aral and the Caspian, all the considerable rivers of A., with the Mackenzie as the only exception, are, more or less, channels of communication between the open ocean and the interior. To take the three grandest examples—the Amazon, with a basin estimated to contain 1,500,000 sq. m., is navigable for steam-vessels up every one of its main branches, nearly to the eastern foot of the Andes; thus comprising several available lines of 2500 m. each, and presenting, as a whole, a network of such lines to the amount of at least ten times that length. The Mississippi, again, navigable as it is at once to the Alleghanies and to the Rocky mountains, and between them, more to the n., as far as the falls of St. Anthony, has been computed to afford to the steam-vessel an uninterrupted career of 36,000 miles. But perhaps the St. Lawrence, if less extensive, is more marvellous still. Owing to British

improvements of its channel, New York and Pennsylvania have virtually a seaboard on their inland shores; while Ohio, Indiana, and Illinois, accessible to ships from the gulf of St. Lawrence by the lakes, and from the gulf of Mexico by the Mississippi, far surpass, in the heart of a continent, the peculiar site of ancient Corinth as the mart of two seas.

To append a few subordinate examples: nearly all the considerable rivers along the coast between the St. Lawrence and the Mississippi possess far more than an average value, in proportion to their lengths, as arteries of internal communication. The Atlantic slope of the Alleghanies, in particular, presents, as a whole, perhaps twice as many facilities in this way as any other region of equal extent on the face of the earth—facilities, too, which have been not less zealously and successfully improved than those of the St. Lawrence. The Hudson has been, at vast expense, and with indomitable energy, connected with the basin of the St. Lawrence at three points—on lake Erie, on lake Ontario, and on lake Champlain; and the Susquehanna has been in like manner connected with the basin of the Mississippi by a canal which terminates at Pittsburg on the Ohio.

But in one part of A., still smaller streams than these last are entitled to particular attention. We allude to those streams, five in number, which promise to vie with each other in connecting together the Pacific and the Atlantic oceans.

The five rivers in question form parts of three different routes. The Atrato of the Atlantic side co-operates with the San Juan of the opposite coast a little below the isthmus of Darien; the San Juan of the Caribbean sea, with the lake of Nicaragua, and with the smaller lake of Leon more to the westward; and, lastly, the Coatzacoalcos of the gulf of Mexico, with the Tehuantepec of the bay of its own name.

To begin with the *first* route: the Atrato and the San Juan flow, in contrary directions, through the slightly undulating country into which the Andes gradually subside as they approach the isthmus. Their head-waters are said to be near to each other, the Atrato being already navigable for small vessels, and the San Juan, manifestly a considerable stream, entering the sea by several mouths, after a course of 150 miles. With such streams separated by such a country, a ship-channel between the two oceans does not by any means appear to be impracticable. Next, as to the *second* route, which, as well as the third, is already in actual use as a place of transit: the San Juan itself, about 100 m. long, has a gentle current, which, though in some places impeded by short rapids, is stated to be always navigable throughout for boats of 10 tons, and for much larger vessels to a considerable distance from the sea. Lake Nicaragua, again, said to measure 140 m. by 40, is adapted for ships of any burden, being 15 fathoms deep. At its w. end it receives the Tipitapa from lake Leon, which, with a length of 35 m. and a breadth of 15, is only 28 ft. higher than itself, or 156 above the level of the Pacific. Two schemes were formerly agitated with respect to the more westerly portion of the route—one scheme proposing to avail itself of lake Leon, and the other to carry the ship canal at once from lake Nicaragua. The latter route was finally chosen. Lastly, as to the *third* route, where the intervening land, actually designated as an isthmus, is only 130 m. wide: the Coatzacoalcos alone is said to traverse nearly the entire breadth: while the Tehuantepec, which gives name to the isthmus, goes far to complete what the other has begun.

The practical value of the enterprise of connecting by navigation the Pacific and Atlantic oceans is already evidenced by the fact, that, in the face of the competition of the last two routes, the Panama railroad is perhaps the most profitable undertaking of the kind in the new world. See PANAMA, ISTHMUS OF; NICARAGUA, LAKE, and INTEROCEANIC SHIP CANAL.

Of the *lakes* of A. a brief notice will be sufficient. In North A., besides the vast reservoirs of the St. Lawrence, a line drawn n.w. from the center of lake Superior appears, on the face of the map, to intersect a kindred series—lake Winnipeg, lake Athabasca, Great Slave lake, and Great Bear lake—the first of the four being connected with the Nelson, and the remaining three with the Mackenzie. It may not be out of place to observe, that the general direction indicated is pretty nearly parallel with the Pacific coast, just as the general direction of the St. Lawrence from the great bend at the head of lake Erie is pretty nearly parallel with the Atlantic shores. As to the secondary lakes of n.w. A., their name is legion, almost every stream, whether large or small, expanding itself here and there vastly beyond its average width, and being, as it were, a St. Lawrence in miniature. One lake, or rather pond, is too singular to be overlooked. On the Athabasca pass of the Rocky Mountains, where the road, little better than a succession of glaciers, runs through a region of perpetual snow, a small body of water, named by the Hudson's Bay Company's voyageurs as the "Committee's Punch-bowl," sends its tribute from one end to the Columbia, and from the other to the Mackenzie. To proceed southwards along the continent, Central A. abounds in lakes. The Leon and the Nicaragua have been already noticed. But such bodies of water are perhaps most numerous on the table-land of Mexico, or as it is often termed, the plateau of Anahuac. The largest of these is Chapala, estimated to contain 1300 sq.m.—an area, which, however insignificant in comparison with the great lakes of the n., is more than equivalent to a circle of 40 m. in diameter. Many of these reservoirs of the table-land have no outlet. Such is the case with the various lakes of the valley of Mexico, inclosed as they are by mountains at a height of 7471 ft. above the sea-level. Of the same description, too, is the lake of Titi-

caca, decidedly the largest in South A. Raised by the table-land of Peru and Bolivia to a height variously estimated at from 12,500 to 12,800 ft., it yet has no outlet to the sea; for the Desaguadero, which empties it, loses itself in Lake Aullagas or Poopó to the southward. Its estimated area is 3261 sq. m. Steam navigation was introduced in 1893. It is irregular in form, and contains several small islands. Shallow in places, particularly at the southern end, it reaches a depth of over 700 ft. near its eastern shore. It is situated in an extensive enclosed basin, which is thought to have once been the bottom of an inland sea.

The vast advantage in point of fluvial communication possessed by the new world over the old, has already been adverted to. There is, however, a hydrographical feature in which one of the grand divisions of the eastern continent is decidedly superior to A. The coast-line of Europe, in proportion to extent of surface, is incomparably longer than that of even the northern half of the western continent. This is at once apparent on glancing at the two maps. It is surely a suggestive fact that the two portions of the earth which are best fitted for human intercourse are also hydrographically so connected as to be beyond comparison the most accessible to each other. The dividing sea, besides being itself physically by far the narrower of the two intercontinental oceans, is virtually narrowed still more by its winds and its currents. Along a belt of about 30° on either side of the equator, the easterly trade with its attendant current wafts the voyager westward from Africa; while above that belt the reaction, strengthened and accelerated by the peculiar formation of the Caribbean sea and the gulf of Mexico, is ready to carry him round again to Europe, under the double pressure of the Florida stream and its generally prevailing breezes from the south-west. Nor yet can the hydrographical relations of A. with Asia be denied their proportion of significance and influence, linked as the two continents are by Behring's strait, and twice bridged as is their ocean, first by the Aleutian isles—a continuation of the Kuriles and Japan—and then by the Polynesian clusters, that series of offshoots, as it were, from the Indian archipelago.

History.—We propose to glance at this under the three heads of aboriginal ages, discovery, and colonization.

As to the *Aboriginal Ages*, there arises a question, too interesting to be overlooked, and yet too doubtful to be solved, as to the origin of the native tribes and peoples of A. Without prejudicing the question (which will be considered under *INDIANS*) whether the aboriginal inhabitants of A. are to be considered, in an ethnological point of view, as substantially of one stock, it appears highly probable that they did not all spring from one and the same primeval band of adventurers; in other words, that different colonies, voluntary or involuntary, must have reached the new continent at different times. This view, to say nothing of the direct testimony of local traditions, seems to be in itself more than probable, when we consider that, through the length and breadth of the universal ocean, even the most insignificant specks of land had each received, at least, one influx of human wanderers. But, beyond such probabilities, and such traditions, the view in question is strengthened by facts, which it is difficult otherwise to explain—by diversities of language, by different degrees, or kinds, of civilization, and, above all, by monuments, architectural or otherwise, of defunct races of by-gone days. On this supposition, whence came the successive shoals of invaders? To this question no direct answer can be given. We can only scan the various routes by which, previously to what we call the discovery of A., the old world was most likely to people the American continent. To begin with the natural routes on the side of the Pacific—Behring's strait, the Aleutian isles, and the Polynesian archipelagoes—we can hardly conceive anything but barbarism having been conducted to A. by any one of them. The country which stretches back from Behring's strait to the Kolyma, may be asserted to be, without exception, the most inhospitable portion even of Siberia; and, moreover, the strait itself has more probably been a channel of migration from America than from Asia, the Tchuktchi of the latter regarding themselves rather as a branch than as the stem of the Tchuktchi of the former. With respect, again, both to the Aleutian isles and the Polynesian archipelagoes, the successive stepping-stones in either series, instead of being presumed to have been so many halts for Asiatic Columbuses and Magellans, must rather be viewed as each a mother-country to a new colony, as each a point of departure for a fresh swarm. Thus would the ever aggravating blight of isolation—exemplified even in the old world among the Laplanders, the Kamtchadales, and the Hottentots—prepare at each remove a deeper and deeper barbarism to land at last on the western shores of A. Further, if civilization, as certainly appears to have been the case, ever did find its way to A., it must have come directly and immediately from the old world, and that under circumstances and conditions of by no means a favorable character. In remote times, such accidental, or, to speak more correctly, unintentional visits of Europeans and Asiatics may have occurred, as we know to have actually taken place in more modern days. Japanese junks have repeatedly been driven, by stress of weather, across the Pacific to the new world; and again, on the Atlantic, the easterly trades, within eight years after Columbus's earliest voyage, wafted the unconscious Portuguese to Brazil, during their second voyage to India—the very first, in fact, which they had attempted by steering clear of the headlands of Africa. Such incidents, however frequently they might have happened, were much more likely to civilize existing communities than to found new ones; and it is at least a curious fact, that the only

aboriginal nations which could be regarded as in any sense civilized at the date of the Spanish conquest, pointed in their traditions to such events as we have endeavored to describe. Mexico and Peru had each had its Cecrops, or semi-divine civilizer—the former referring him to the east, across the Atlantic, and the latter to the west, across the Pacific. How far such hypotheses may account for the admitted facts, we are not left altogether to conjecture. Isolated individuals of our own nation have enabled us to bring the light of the present to bear on the past. When we consider what William Adams achieved in Japan, 200 years ago, and what John Young and James Brooke have, more recently, effected in the Sandwich islands and in Borneo, we can perhaps more easily understand certain undeniable traces and traditions of aboriginal civilization.

Discovery.—Whatever may have been the kind and degree of aboriginal civilization, A. was not destined to be the perpetual inheritance of the red man. New actors were to appear on the scene, before whom the old possessors were in a great measure to pass away.

Previously to the times of Columbus, Europeans had certainly visited A. The Scandinavians, after having colonized Iceland in 875 A.D., and Greenland in 983, had, by the year 1000, discovered A. as far down as $41^{\circ} 30'$ n. lat., a point near to New Bedford, in the state of Massachusetts. These Scandinavians afterwards settled in the neighborhood—the mother-country, most probably through the intervention of Iceland and Greenland, maintaining an intercourse with the colony down to the 14th century. But these enterprises do not appear to have left any special impress on the character or prospects of the new continent, being more akin, perhaps, to similar incidents of yet earlier ages, than to the long-meditated and well-matured scheme of the illustrious Genoese. Subsequently to the Scandinavian discovery, and previous to that of Columbus, A. is believed by some to have been visited by a Welsh prince. In the narrative of Humfrey Lloyd (1559) it is stated that Madoc, son of Owen Gwynnedd, prince of Wales, set sail westward in 1170 with a small fleet, and, after a voyage of several weeks, landed in a region totally different both in its inhabitants and productions from Europe. Madoc is supposed to have reached the coast of Florida. Neither this, however, if true, nor the earlier Scandinavian expeditions, can be said even to have formed a connecting-link between the A. of the red man and the A. of his white brother. Even if the northmen had possessed resources worthy of their heroic courage, the old world was not yet ripe for the appropriation of the new.

At the end of the 15th c., however, science and politics were alike strengthening Europe for its task. The mariner's compass and the astrolabe had facilitated long voyages out of sight of land; while, in almost every country of Christendom, various causes were consolidating government, and promoting the growth of population—a position which derives, perhaps, its best illustration from the fact that the capture of Granada—the last foothold of the Moslem in Spain—preceded by only a few months the discovery of A.

Columbus (q.v.) set out on his great enterprise to discover A. under the patronage of the crown of Spain, on Friday, the 3d of Aug., 1492; at which date, properly speaking, begins the deeply interesting history of A. Had the Atlantic been broader, or had not the easterly trades wafted Columbus almost on a parallel from the Canaries to the Bahamas, he must have failed in his bold attempt; and in fact, those same easterly trades, assisted by a still nearer approach of the two continents, speedily proved their own value in this respect by carrying the Portuguese, without their own consent, to the shores of Brazil. Nay, Columbus's discovery of A., if not so accidental, was quite as unintentional as that of the Portuguese. It was towards the e. that his hopes directed his western course, hopes whose supposed fulfillment still lives in the misapplication to the new world of the terms Indian and Indies. Much of our subsequent knowledge of A. has been owing to the same desire of reaching the East Indies that led to its discovery. The gorgeous east was the aim alike of Davis, Baffin, and Hudson at the n., and of Magellan, Schouten, and Lemaire at the s., to say nothing of the earlier enterprise of Balboa on the isthmus of Darien; while, under a similar impulse, the French of Canada were ascending lake after lake as nature's ready-made highway to the same goal. Even to more recent times may these remarks be applied. While the eastern coasts of Africa, and the upper shores of Asia, as not bearing on the grand question of oriental traffic, were comparatively neglected and forgotten, Cook and Vancouver, who were in quest of a passage between the two oceans, surveyed every nook and cranny of A. from Columbia river to Behring's strait. Nor yet have the aspirations of Columbus and his noble band of successors and imitators been altogether disappointed. That same continent which, in their case, barred a westward advance along nearly the whole interval between the arctic and antarctic circles, has to us already become, or is gradually becoming, more than a substitute for the ocean which it was found so extensively to displace. By means of the railway across the isthmus of Panama, and with the completion of the interoceanic ship canal (q.v.) through Nicaragua, the Caribbean sea and the Pacific ocean will be practically united. Three interoceanic railways have been chartered in Mexico. In the United States, six great lines with their connecting roads, virtually bring the e. and w. shores near together; the average time required to make the journey across the continent (seven days) being little more than was formerly spent by stage coaches between Boston and New York. The Canadian Pacific railroad adds one more to these agents of transportation. The

Pennsylvania railroad, originally connecting Philadelphia with Pittsburgh, now embraces an uninterrupted line from ocean to ocean, with numerous branch lines, and forms the longest line of railway in the world, being 3278 m. in length.

But Columbus found something better than what he himself or his successors and imitators looked for. He had discovered a land which, besides eclipsing India in the richness and variety of its commerce, was to confer on Europe a still more solid benefit. Colonization, which, since the early ages of Greece, had slumbered for 2000 years, received an impetus which, after building up empires in the west, was to build up others in an east richer far than that which was so long the loadstar of European navigators—an east where, almost without a metaphor, the grass was to be wool, and the stones to be gold.

The first fruits of Columbus's enterprise were the Bahamas, Watling's Island probably being the spot where he landed on the 11th of Oct., 1492. Without attempting, in so summary a sketch as this, to distinguish the results of each of his four voyages from each other, it may be sufficient to state that this great man, besides Hispaniola, or St. Domingo, Cuba, Jamaica, and others of the Antilles, discovered and explored Central A. from Honduras southward along the coast of Veragua, and South A. from the mouths of the Orinoco westward, as far as Margarita. It was on this last-mentioned scene of his operations that he was followed by Hojeda, whose pilot, Amerigo Vespucci (q.v.), has been allowed to wrest from Columbus the glory of giving his name to the new world. Within twenty years after Columbus's first discovery, Ponce de Leon discovered Florida; and, what was certainly of far more consequence, he ascertained that, through the strait which separated that peninsula from the Bahamas, there constantly ran a strong current to the n.e. In 1513, again, just one year later, Vasco Nunez de Balboa crossed the isthmus of Darien to the Great South sea, or, as it was afterwards named, the Pacific ocean. About thirteen years before this last event, almost immediately after Columbus's own continental explorations, the interval left between his most southerly point from Honduras, and his most westerly point from the Orinoco, was, in a great measure, filled up by the voyage of Bastidas. To the s., again, of the Orinoco, Pinzon and Solis sailed along the continent down to 40° s. lat., between the years 1500 and 1514. The former, after anticipating, by a few months, the Portuguese on the shores of Brazil, had seen the Amazon; and the latter, sent out for the express purpose of entering, if possible, Balboa's Great South sea, found his way into the La Plata or Plate, being there slain by the neighboring natives. Moreover, to return to the northward, by the year 1519, different navigators had between them completed the examination of the gulf of Mexico. Within twenty-seven years, therefore, after Columbus's first departure from Spain, the eastern shores of South and Central A., had been almost continuously explored by the Spaniards down to within 15° of the southern extremity of the continent.

Nor had other nations been idle in the n. The Cabots, on behalf of England, had discovered Newfoundland, and portions of the adjacent continent, in 1497. In 1500, the Portuguese, under the Cortereals, sailed along the coast of Labrador nearly up to Hudson's bay, having, it is supposed, entered the gulf of St. Lawrence, long known among them as the gulf of the Two Brothers. Thus gradually there grew up the opinion, since proved to have been the true and sound one, that any practicable passage between the two oceans must be looked for towards the s. of the Plate. Accordingly, in 1519, Magellan, a Portuguese in the service of Spain, undertook the voyage in which was discovered the strait that bears his name—a voyage which furnished the first instance of the circumnavigation of the globe. Thus there remained little to be done, unless in the extreme n. and the extreme s. In the extreme s., Schouten, a Dutch navigator, discovered, in 1610, the passage round cape Horn; while, six years thereafter, Lemaire, a mariner of the same nation, passed through the strait of his own name between Staten Island and Terra del Fuego. Towards the n., again, the French and English divided the labors and honors of the enterprise between them. Scarcely had Magellan's companions—for he had himself been killed—returned to Europe, when Verazzano, under the auspices of Francis I. of France, sailed along what are now the Atlantic shores of the United States, thereby connecting the discoveries of the Cabots with those of Ponce de Leon; and again, about ten years later, Jacques Cartier, in the service also of the same prince, explored the gulf and river of St. Lawrence, penetrating as far to the westward as the island of Montreal. In the extreme n., however, the English may be said to have been without a rival. It is unnecessary, in this summary sketch, to do more than mention names which tell their own story on every map—Davis, Baffin, Lancaster, and Hudson. (See these heads.)

To pass now to the western coast of A. The conquerors of Mexico and Peru effected, in a few years, more perhaps than they left behind them for future ages to effect, ranging along the coast from the southern extremity of Chili to the peninsula and gulf of California. Beyond lower California, the only direction in which there was much to do, the English Drake, whose voyage took place in 1578, divided with the Spaniards the credit of having discovered upper California. For nearly two centuries, excepting the half-fabulous voyages of Fonte and Fuca, the Spaniards and the English alike slumbered over their task; and it was not until towards the close of the last century, that Cook and Vancouver co-operated with Spanish and American navigators in dispelling the mystery that had so long hung over the n.w. coast of A.

To advert to *inland* discoveries: As early as 1537, within six years after the landing

of Pizarro in Peru, and within two after the founding of Buenos Ayres, the Spaniards met each other on the eastern borders of Peru, from the opposite shores of the continent; and, in 1540, within three years more, they sent forth that eastward expedition which ended in Orellana's exploration of the Amazon, from its source to its mouth. In the northern half of the continent, similar enterprises were of a much later date. It was in 1682 that the French first descended the Mississippi; it was in 1771 that Hearne traversed the wilderness from Hudson's bay to the mouth of the Coppermine; and it was respectively in 1789 and 1793 that Alexander Mackenzie reached the mouth of the river that bears his name, and passed through what is now British Columbia, to the shores of the Pacific ocean.

Colonization.—Among the European powers that colonized A., the most prominent were Spain, Portugal, France, and England.

Spain, of course, took the lead, having, with few exceptions, accomplished its task before any rival state had entered on its share of the work. In one respect, its colonies differed from all others on the new continent. Spain alone came in contact with civilization, such as it was among the aborigines; and accordingly, in the cases of Mexico and Peru, colonization required to be preceded by something like regular war and formal conquest. But, notwithstanding this peculiar obstacle, the colonies of Spain grew at first with a rapidity which, perhaps, has scarcely found its parallel even in the somewhat congenial case of Australia. As an illustration of this—for the statement needs no proof—it was colonial resources that armed Cortes and Pizarro for their respective enterprises. Without the direct and immediate aid, in either instance, of the old country, Cuba, within 27 years after the first discovery, equipped the conquerors of Mexico; while the town of Panama, only 12 years later, sent forth the adventurers that were to subjugate Peru. So unexampled a degree of vigor and vitality continued to advance in Spain's transatlantic possessions, precisely while they were so organized and conducted as to afford scope to individual ambition. Never, perhaps, was this scope sufficiently free and full, for, even from the beginning, government often embarrassed and blighted the fairest schemes by its jealous and suspicious interference. But, for a time, it generally found its account in tolerating the unrestricted liberty, or license, of its instruments. It was, therefore, only after law and order were established, and the original actors had disappeared from the scene, that the authorities of the mother-country stereotyped, as it were, their despotism along the length and breadth of every colony. From that moment, vigor and vitality were succeeded by stagnation and torpor. Still, with such elements of prosperity on every side—above the earth and below it—material interests could not fail to flourish. But the soul had fled; the body alone remained behind. Under these circumstances, Spain, though continuing to claim the entire continent to the n., more especially on the Pacific, did very little to enforce its pretensions. To this remark, New Mexico and upper California were the only exceptions. It was not before 1594 that New Mexico was at all occupied; and it was not till a century later that the province, after 10 years of bush-fighting, was finally subdued; while it was only in 1767 that the Franciscans, on behalf of Spain, took possession of upper California. But Spain never abandoned the hope of extending its dominions towards the n.w. coast. As late as 1790, that power, while restoring Nootka sound, and acknowledging England's right of planting other settlements, took the precaution, useless as it proved, of expressly reserving a similar right to itself; and it was only in 1819, nearly 30 years later, that Spain formally ceded to the United States all its claims to the coast above the parallel of 42°. See further under the separate head of AMERICA, SPANISH.

The efforts of Portugal, in the cause of American colonization, were at first less energetic than those of Spain. In fact, Portugal, which had doubled the cape of Good Hope in the year 1497, was so zealously engaged in the east as to allow an age to elapse before sending any colony to Brazil. The discovery of the country took place in 1500; but its colonization only in 1531, or rather 1548. Within 32 years thereafter, in 1580, Brazil, at the same time as Portugal itself, was annexed to the Spanish monarchy, soon afterwards falling, in this its new character, partly into the hands of the revolted Hollanders. In 1640, Brazil, as well as Portugal, threw off the Spanish yoke with the help of the Dutch settlers. But the continued presence of the latter retarded the progress of the colony. It was only after their expulsion, that the Portuguese, who had lost nearly everything in India, turned their attention more largely to Brazil. It accordingly became the most flourishing colony, as such, to the s. of the English settlements; and, as the refuge of the house of Braganza from French domination, it received, about 50 years ago, an impetus which has rendered it, as an independent state, the most flourishing power of southern America.

France, as the claimant to the basins of the St. Lawrence and the Mississippi, may be said rather to have pitched camp than to have planted colonies in those vast possessions. She regarded A. chiefly as a supplementary battle-field for England and herself. Every French settlement was but an inert part of a political machine, powerful, indeed, but unwieldy, expensive, and unproductive. The government was everything, and the individual subject was nothing. Hence, neither Louisiana nor Canada at all realized our idea of a colony. In corroboration of this may be cited two authentic and official facts. As an encouragement to marriage, rewards and exemptions were held out to the parents

of three children; and the erection of a dwelling on a lot of less than 40 arpents (about 32 acres) was prohibited by a royal ordinance. In 1762, France gave up Canada to England, and, as an indirect concession also to the same power, transferred Louisiana to Spain—events which, singularly enough, did much to facilitate France's grand scheme, the separation from England of her old colonies.

England, the most energetic and successful of all in the work of colonization, was the last in the field among the four powers already mentioned. Among her continental colonies, to say nothing of Newfoundland, Virginia, the oldest, was established in 1607, just 4 years after the union of the crowns; and Georgia, the youngest, as late as 1733. With these two exceptions, the remaining 11 were, one and all, founded during that period of civil and religious troubles which, in the mother-country's own history, sent one Stuart to the scaffold, and drove another into exile. In 1620, Massachusetts was occupied by Pilgrim emigrants; in 1623 and 1631 respectively, New Hampshire and Connecticut were first settled; in 1634, Maryland was granted to lord Baltimore, a Roman Catholic nobleman; in 1636, Rhode Island became a refuge for Roger Williams, banished from Massachusetts; in 1653, North Carolina became an offshoot from Virginia; in 1664, New York, New Jersey, and Delaware were taken from the Dutch; in 1670, South Carolina was established; and in 1682, Pennsylvania was granted to William Penn, the Quaker, continuing to be a proprietary government down to the revolution. In nearly all these cases, the civil and religious liberties for which chiefly the colonists expatriated themselves, were secured by liberal, nay, virtually republican charters. Subject only to the appointment of a governor on the part of the crown, every colony was practically a state within itself; and it is a suggestive fact that the very earliest assertion of legislative superiority on the part of the mother-country was 7 and 8 Will. III. c. 22, which, however, only operated negatively by forbidding every colony to make laws repugnant to those of England. With such aspirations and such institutions, the enterprising inhabitants of a new home could not fail to prosper; while their prosperity was rendered more solid and permanent by the comparative poverty of a region where steady industry in agriculture or in the fisheries, was, as it were, a necessity of life. Under these circumstances, the germs of political independence were at work long before the year 1765; and it is not merely a probability, but a fact, that the expulsion of the dreaded power of France from Canada and Louisiana, in 1762, was closely connected with the troubles which so soon began.

The colonization of the West Indies, Guiana included, will be seen at a glance in the appended table of American governments.

It may be added, in conclusion, that the whole of A. is now in the hands of European races, including the aboriginal Araucania in the s. of Chili, and excepting the African republic of Hayti, otherwise known as Hispaniola or St. Domingo, the oldest among the colonies of Spain.

American Antiquities.—The architectural remains, to which we have already alluded in connection with a general estimate of aboriginal civilization, are to be found in each of the grand divisions of the new continent. To begin from the north. That portion of the United States which lies between the Appalachians and the Rocky mountains presents in three groups at once the oldest and the rudest monuments of by-gone times: the first group extending from the sources of the Allegheny to the waters of the Missouri; the second occupying the Mississippi valley, vaguely so defined; and the third stretching from South Carolina to Texas. These several groups, apparently with very little difference among themselves, consist of numberless mounds, and circumvallations of earth and stone—1500 of the latter, and 10,000 of the former, being said to stud Ohio alone. The erections themselves range from 5 to 30 ft. in height; while the areas inclosed—generally of some symmetrical figure, such as circle or ellipse, rectangular parallelogram or regular polygon—vary from 20 to 40 acres, though among a few of greater extent, one in Arkansas is stated to embrace a square mile. The circumvallations, moreover, seem generally to contain the mounds; and sometimes a smaller circumvallation is surrounded by a larger one. Whether these colossal structures were intended for worship or for defense, it is impossible to decide; more probably, however, they were of a military character, provided, as they ordinarily were, with cisterns for water. But, whatever their origin, they derive interest from the analogous fact, that, within the same territorial limits, have been dug up vases of earthenware or copper in elegant forms, pipe-bowls decorated with human heads of the type of the existing aborigines, or with those of birds, etc., domestic utensils, personal ornaments, hatchets of stone, and, lastly, weapons of copper or mica, or shell or obsidian.—The architectural remains of Central and South A. are at once of more modern origin and more elaborate character, and may be roughly compared with the cyclopean ruins in Italy and Greece. Uniformly in the pyramidal style—a style likely enough to be indigenous in a region of earthquakes—they are composed of blocks generally huge, and sometimes enormous; those in the walls of Tiahuanaco in Bolivia being equivalent to cubes of about 16 ft. each way. Between those of South A. and Central A., however, there are diversities as well as resemblances. Those of South A., situated, as they are, within the native limits of Peru, and referred, as they must be, to its closing era under the incas, cannot reach back beyond the Spanish conquest more than 300 or 400 years: the principal ruins are those of Tiahuanaco, already mentioned; of a temple on an island in lake Titicaca; of another edifice of the kind at Pachacamac,

not far from Lima; and of the palaces and mausoleums of the royal race. Those of Central A., again, are reckoned to be considerably more ancient, reaching five or six centuries further back, and being partly the work of the Aztecs, whom the Spaniards conquered, and partly of the Toltecs, whom the Aztecs had themselves supplanted. Nor is the fact altogether without significance, that, in the two more southerly divisions of the continent, those mysterious records of the past are generally superior in development in proportion as they are anterior in age; those of Central A., as a whole, surpassing those of South A.; and, again, within Central A. itself, the earlier specimens of Oaxaca, Guatemala, and Yucatan, eclipsing the later ones of Mexico proper. While attempting, in the light of these remains, to appreciate aboriginal civilization, we cannot fail to be struck rather with their magnitude than with their beauty, rather with the evidence of despotism in the ruler than with traces of skill in the subject—Stonehenge affording us infinitely more of a parallel than Windsor castle or Westminster hall. Nor does the sculpture, so often subsidiary to the architecture, lead to a more favorable inference, being generally rude and clumsy, and sometimes grotesque and hideous. The only safe conclusion is this, that, in the new world as in the old, there were different degrees of civilization; some of them confessedly higher than one could have expected in the utter absence of the useful metals, and the almost utter absence of beasts of burden. Nor has even this conclusion any necessary bearing on the better organized communities at large. Stray visitors of a higher type might have produced all the phenomena—visitors precisely such as appear to have figured in the traditions both of Mexico and Peru.

Geology.—The geology of the new world presents some remarkable contrasts to that of the districts in the old world which have supplied the types of geological classification. None of these is more striking than the enormous extent of country which one formation occupies, and that without interruption. It has long been noticed that the rock-structure of islands is more varied than that of continents; and thus it is that the inhabitants of the British isles have been to some extent compelled to become acquainted with geology. A journey of a few hours presents to the traveler rocks which, as regards both their mineral and fossil contents, are widely different. In A., on the other hand, one may travel for days over beds belonging to a single epoch. American strata often stretch from the Atlantic w. beyond the Mississippi. They have, on the whole, been subjected to few disturbing agencies; as is evidenced by the absence of any true mountain-range, except the Appalachians, e. of the Rocky mountains. The rocks of Britain, from their disposition and variety, have been, so to speak, the “primer” and “pocket manual” of this science, and will always continue to be the “*vade mecum*” of the geologist; but should he desire to peruse the large “folios” that contain the stony records of our earth’s history, in their order and natural vastness, he must betake himself to the new world.

It is not many years since attention was first directed to American geology, but during the short time that has intervened, its progress has been very remarkable. This has resulted from the Federal and state provision for extensive geological surveys in the United States, from the vigorous operations of the Canadian survey under Sir W. E. Logan, and from the observations of arctic explorers, whose frequent visits to these regions in search of the ill-fated Franklin have supplied data for the exposition of their natural history. Humboldt, though the first, is yet the most important of S. American observers. The numerous facts recorded by him have been confirmed and added to by recent travelers. Data have been thus supplied to form an approximate estimate of the geological structure of this portion of the American continent.

The names of N. American observers are almost past reckoning, yet the various systems may be said to have been chiefly laid open by four sets of observers—Morton for the cretaceous, Conrad for the tertiary, Hall and the New York geologists for the palæozoic, and the professors Rogers for the carboniferous strata and the Appalachians.

In the following rapid sketch of this subject, we can do nothing more than glance at the various formations, and must refer for details to the articles under the different divisions of America.

The oldest strata are a range of CRYSTALLINE ROCKS which, in North A., occupy an area that extends from the northern shores of lake Superior and the banks of the St. Lawrence, n.w. to the Arctic ocean, and lies between the line of minor lakes (Slave, Winnipeg, etc.) and Hudson’s bay. The average width of this area is about 200 m., and its length from lake Superior to its termination on the shores of the Arctic sea is more than 1500 miles. The rocks are chiefly gneiss, with granite and trap. They form a flat plateau, very little elevated above the surrounding country, and only in the Copper mountains rising to the altitude of hills, the highest of which is 800 ft. above the sea-level. In this immense plain we have an example of the great characteristic of American geology—the tranquil operation of an upheaving force, exerted over a wide area, with limited and regulated intensity, and constancy of direction. This series of rocks stretches over nearly the whole of the eastern portion of South A., extending from the northern shores to the mouth of the La Plata, being, however, hidden in the valley of the Amazon by its alluvial deposits. The same rocks form the western slopes of the Andes and Rocky mountains, and the plains of Russian A. In the central district, in which we first traced them, they dip e. and w. under the silurian strata. They are them-

seives free from superincumbent beds, showing that even in the silurian age they formed dry land; and ever since, although subject, like the rest of the world, to great oscillation, they have apparently held their place with wonderful stability, for they are now, as probably then, not far above the level of the sea.

On either side of this tract there exists, as we have said, a SILURIAN district. That on the eastern side, reaching to Hudson's bay, has a low and uniformly swampy aspect; the strata are hid by superficial deposits, chiefly boulder clay or drift, large boulders from which are scattered along the shore. The silurian rocks under which the crystalline strata dip on their western limits, cover a large extent of the North American continent. They have been traced from Canada and New England, bounding the southern limits of the azoic rocks along the line of the great lakes, and extending in a broad band of some 200 m. parallel to the more ancient formation, probably till they reach the Arctic ocean. These rocks are only slightly developed in South A., on the eastern slopes of the Andes.

The silurians have been divided into *lower* and *upper*, and each of these contains three periods. Beginning with the lower, we have first the

Potsdam period, comprising beds of slate and sandstone, and containing fossils representative of the three great divisions of the animal kingdom—mollusks, articulates, and radiates. Next follows the

Trenton period, a period of limestones indicating a sea of greater depth, and teeming with life, for some beds are composed entirely of shells and corals.

Another change, and rocks of a clayey and shaly structure are deposited, containing numberless zoophytes and other fossils, and forming the *Hudson period*.

The upper silurian division also comprises three epochs: *The Medina and Clinton*, composed of sandstones and shales; then *the Niagara and Onondaga*, with limestones and saline rocks; and, lastly, *the lower Helderberg period*, a richly fossiliferous series of limestone rocks.

The silurian beds on their southern and western borders dip under the Devonian rocks, which are developed to a large extent north of lat. 72° n., where they appear to rest upon the azoic rocks. They have been divided into five periods: *Oriskany, upper Helderberg, Hamilton, Chemung, and Catskill*.

Vast beds of conglomerate overlie the devonian rocks, and form the basis of the CARBONIFEROUS strata. This formation covers large districts in New Jersey and Pennsylvania, and in the Ohio and Mississippi valleys, with an enormous thickness of limestone, shale, and other beds, which still continue parallel to the previous. At the close of the carboniferous epoch, the whole character of North A. was altered by the formation of its mountain systems. No hill higher than Copper mountain seems to have existed at this time, although the land occupied much the same area, and had a similar outline as at present. The Professors Rogers, having with perfect success unraveled the contortions of the Appalachians, have shown that the silurian, devonian, and carboniferous strata, which were originally laid out in horizontal layers, were afterwards pressed on to the north-westward, and folded up till the folds were of mountain height. To similar causes do the Rocky mountains and the Andes owe their origin—only the directions of the forces are different.

The Appalachian fires have long been extinguished; they have, however, left traces of their former violence in the highly metamorphosed silurian and carboniferous rocks of New York and Pennsylvania, which were long supposed to be primary granite, etc. The igneous agency, which at first raised the western range, is still active at intervals throughout its course.

There seems to have been a rest in the deposition of sedimentary strata at this time. The only activity was that of the earthquake and the volcano. Two whole formations—the permian and triassic—have no place in the rock-structure of A. The first renewed signs of life are discovered in the sandstones which occupy the valleys on the eastern side of the Appalachians. In these beds, which belong to the OOLITIC period, occur the tracks of birds and reptiles, discovered and described by prof. Hitchcock.

In the CRETACEOUS beds which follow, evidence is given that the Mexican gulf extended far up the Missouri valley, and sufficiently deep to cover Texas and Nebraska with the beds which belong to this formation.

The TERTIARY formation is developed as a band of about 60 m., forming the southern extremity of North A., and stretching from North Carolina to the peninsula of Yucatan, leaving the coast-line only at the delta of the Mississippi. This formation occupies a large amount of the surface of South A. From Patagonia to Venezuela it can be traced occupying the space intervening between the base of the Andes and the azoic rocks of Brazil and Guiana. The older silurian and carboniferous deposits are not found in the positions they occupy in the northern continent; the gneiss, etc., dip directly under the tertiaries.—The valleys of the Amazon and the La Plata, and the mouth of the Mississippi, contain extensive *alluvial* deposits.

There only remain two post-tertiary beds, which, however, are of considerable importance—viz., the *boulder clay* and the *river terraces* or *loess*, containing the remains of the mastodon and of the elephant. The boulder clay occurs in the country n. of lat. 40° n., and in Patagonia in South A. Its characteristics are the same as that in the old

world—a stiff clay, containing bowlders of all sizes, some being as much as one or two thousand tons weight. The origin of this remarkable deposit is ascribed to the former prevalence of vast glaciers over the n. and s. parts of A.

The pampas of South A. are covered with a deposit of clay and sand, containing the bones of the megatherium and mylodon, genera allied to the sloths, and of the glyptodon, a huge armadillo. For details, see ANDES, APPALACHIANS, ROCKY MOUNTAINS.

Botany.—On the discovery of A., Europeans regarded with astonishment its vegetable and animal productions, so different from all that they had ever seen before. The difference between the productions of the old and new worlds is least remarkable in the most northern regions. Around the n. pole, a region having a flora and fauna which may properly be designated arctic, includes portions of the three continents of Europe, Asia, and A.; and many productions are common to these three continents throughout this region, whilst those which are peculiar to one, are generally represented in the others by species nearly allied. In A., this region extends to the northern shores of lake Superior. The polar bear haunts the arctic regions of the old and new worlds alike; and further s., in both, the beaver builds his dam, and is pursued for his skin. Pine and birch are the chief trees of all the most northern forests, and struggle on, dwarfed and stunted, towards the regions of perpetual snow; whilst the berries of different species of *rubus* and *vaccinium* (bilberry, etc.,) are the last fruits which the soil offers to man during the brief summer of the north—alike to the Laplander and the Esquimaux.

More to the s., the flora and fauna of A. become more decidedly different from those of the old world; yet the difference consists not so much in the appearance of new families as in new species, replacing, so to speak, those of Europe and of Asia. The forests consist chiefly, as in these continents, of pines, oaks, birches, and willows; but the pines, and oaks, and birches, and willows are not the same as those which cover the plains and mountains eastward of the Atlantic. The same remark applies to poplars, elms, planes, maples, hazels, and other kinds of trees, and to plants of humbler growth, as roses, brambles, strawberries, bilberries, etc., the pasture grasses, and the common flowers and weeds, although umbelliferous and cruciferous plants are comparatively rare. Not unfrequently, also, forms occur more completely different from those of the other quarters of the world, and these become more numerous as we proceed southward; although the magnolias, which form so admirable a feature of the flora of the southern Alleghanies and other southern parts of North A., have recently been found equally to characterize that of the e. of Asia and of the Himalaya mountains, where magnificent species of rhododendron have also been discovered, rivaling or excelling those which are natives of the United States, and very different from the dwarf shrubs which represent the same genus on the mountains of Europe. It is remarkable that no true species of heath is found in A., although many shrubs of the same family occur, but none of them so strongly exhibiting the *social* character, or covering great tracts, as the heaths do in Europe. Where the climate begins to assume a tropical character, however, A. is distinguished by the abundance of the *cacti* (the prickly pear and its allies) which are found on its plains, often forming the greater part of their vegetation. The species of this order, so far as is yet known, are exclusively American, although some of them have been introduced into the warmer parts of the old world, and are now very common in the s. of Europe and elsewhere. The mountains of Mexico are, to a large extent, clothed with oaks and pines, most of them, however, different not only from those of the eastern continents, but even from those of the more northern parts of A. The flora of tropical A. resembles that of Asia and Africa in its palms, although these also are with few exceptions different in species; and the species are more abundant than in any other part of the world. It appears, indeed, that palm-forests like those of South A. scarcely exist elsewhere. The forests of the hottest parts of South A. produce also many remarkable trees of other kinds, among which may be mentioned the trees of the order *lecythidaceæ* (q.v.), one of them known as the cannon-ball tree, and all of them producing huge fruits, with thick hard shells, which are often used for domestic purposes; whilst within the shell of a particular species are packed together the well known Brazil nuts (q.v.) of our shops. In the waters of the same region has recently been discovered the *victoria regia*, the most magnificent of water-lilies, and for the growth of which, hot-houses containing ponds of water have been erected in our own country. The forests of this part of A. are so dense and full of underwood, and the trees so bound together by *lianas* or twining plants, that they are in many places impenetrable, and the animals which inhabit them either find their way among the branches, or by narrow paths, which they keep open by constant use. The treeless plains of South A., like those of North A., have, in general, much of a grassy vegetation. Part of the elevated regions of the Cordillera, within the torrid zone, is remarkably characterized by the presence of *cinchona*, which form its principal botanical feature, and yield the celebrated Peruvian bark. In still more elevated regions, *escallonia* and *calceolaria* give a novel aspect to a vegetation otherwise very similar to that of Europe in its general character, and containing saxifrages, gentians, and many other plants of genera common in the old world. The flora of Chili presents also some interesting points of resemblance to that of New Holland and New Zealand. An *araucaria*, now not unfrequent in our pleasure-grounds, appears as a representative of the pines; and its seeds afford a large part of the food of

the natives of the district in which it abounds. Towards the strait of Magellan, vegetation again assumes forms more similar to those of Europe. The forests consist in great part of peculiar species of beech. Barberries, different from those of other parts of the world, but very nearly resembling them, are particularly abundant; and with them occur brambles, saxifrages, gentians, primroses, etc. There are also vegetable productions very different and peculiar, as the winter's bark, which has obtained some reputation as a medicine. From this region are derived several species of the fuchsia now so familiar an ornament of gardens, greenhouses, and cottage windows in Britain, and which are exclusively American.

Maize is one of the most important of the botanical productions of A. It is the only cultivated grain of American origin; it was in cultivation before the discovery of A. by Europeans, by whom, however, its value was soon recognized, and it has now become an important crop in climates suitable for it in all quarters of the world. The other grains have all been introduced into A. by Europeans, with the sugar-cane, the banana and plantain, coffee, cotton, flax, and many other plants now generally cultivated both in the tropical and temperate regions. The yam is regarded as amongst its native productions, common to its tropical regions with those of other quarters of the world. Tobacco is a native production of A., the cultivation and use of which extended from it to the old world, and rapidly became prevalent among a great part of mankind. (It is indeed supposed by some that there is a species of tobacco indigenous to the furthest east; but this, and the question of its use there before it was made known from A., are still involved in uncertainty.) But of all the vegetable productions of A., the potato is the most important and useful. We owe to it also the Jerusalem artichoke; and it produces several other plants, valuable for their roots and tubers, as the arracacha, the melloco, etc., the use of which has scarcely yet extended beyond their native regions. With them may be mentioned the quinoa, which is not a grain (the seed of a grass), but the seed of a species of *chenopodium*, or goosefoot, resembling the seeds of the cereal grasses in its qualities, and extensively cultivated on the high table-lands of Chili and Peru. Tapioca, arrow-root, cocoa, vanilla, pimenta or Jamaica pepper, and Cayenne pepper, are among the native productions of the tropical parts of A. The agave (q.v.) or American aloe, valuable both for its fiber and its juice, has now become common in the warm parts of Europe, and in similar climates in other quarters of the globe. The pine-apple is a native of tropical A., although now naturalized, or nearly so, in other tropical regions. Tropical A. and the West Indies produce also many other fine fruits, among which are the guava, different species of anona or custard apple, and of granadilla or passion flower.—The forests of North A. yield much valuable timber, chiefly consisting of different kinds of oak and pine. The black-walnut and hickory of the United States are also much esteemed. The West Indies and neighboring parts of the mainland yield mahogany; and from the same regions comes logwood, one of the most useful of dye-woods. The tropical forests of South A. produce many valuable timber-trees, of which perhaps the most deserving of notice are the greenheart (q.v.) or bibiri, and the mora. Brazil-wood and Pernambuco wood are among their dye-woods. One of the most remarkable productions of this region is the cow-tree (q.v.), the juice of which possesses many properties in common with milk, and is used instead of it. The milky juice of some other trees of tropical A. thickens into caoutchouc.—Different parts of South A. produce *maté* (q.v.) or Paraguay tea, a species of holly, the leaves of which possess properties similar to those of tea and coffee, and afford a beverage which is extensively used, although not yet an article of export to other parts of the world; and the coca (q.v.), a shrub of which the leaf has been, from a remote period, employed by the Indians as a narcotic.

Zoology.—In the animal kingdom, as in the vegetable, all seemed strange and new to Europeans when they first set foot in A. Yet here also the difference from the productions of Europe is not so great as in south Africa or Australia. In North A., many of the animals, as of the plants, of Europe are represented by others of the same genera or families. A few are common to the old and the new world; and in some which are now regarded as specifically different, the difference is not so great as readily to attract the notice of unscientific observers. North A. has its elk and its deer, its oxen (the bison, called buffalo in the United States, and the musk-ox), its sheep (the Rocky mountain sheep), its beavers, hares, squirrels (some of them much sought after for their fur), mice, rats, weasels, bats, porcupines, bears, badgers, foxes, wolves, and several species of feline animals, among which are the puma and the lynx. The jaguar, more powerful and dangerous than any other of the feline animals of the new world, and its only very formidable beast, except the grizzly bear, inhabits the tropical forests of South A. The warm parts of South A. produce the great tapir, peccaries, sloths, anteaters, armadilloes, etc.; but the elephant, rhinoceros, hippopotamus, and boar of the old world, have no more nearly allied representatives. The llama and its congeners, among which is the alpaca, are peculiar to South A., inhabiting the Andes of Chili and Peru. Of the animals of the old world, the most nearly allied to them is the camel, which is entirely wanting in the new; as was also the horse (with all its congeners), until it was introduced by Europeans—a sight of wonder and of terror to the Mexicans and Peruvians who first found themselves opposed to Spanish cavalry, but now thoroughly naturalized,



NORTH AND SOUTH AMERICA.—1. Aleutian winter-house. 2. Dakota warrior. 3. Llama woman and Assiniboine child. 7. Peruvian balsam. 8. Dakota snow-shoe. 9. Inal. 13. Caribbean village. 14. Esquimaux of Prince Regent's Bay. 15. North-American Mandan Indians. 19. Toucan. 20. Esquimaux of Kotzebue's Sound. 21. Armadillo.



4. Mandan wigwam. 5. Esquimaux bow and missile used in hunting sea-fowls. 6. Dakota snow-shoe. 10. Indian arrows (California). 11. Alaskan bark-basket. 12. Inalit shrine. 13. Quichua (Peruvian) Indians. 17. Aleutian lip-ornament. 18. Air-burial, 19. Pipe-head from an Indian-grave. 23. Copper axe-head.

and roaming in vast multitudes on the South American plains. The dog existed in A. before the days of Columbus; it existed in different varieties as a domesticated animal, and the same difficulty arises concerning the origin of the domesticated varieties as when those of the old world alone are considered. The chinchilla, so valuable for its fur, is a small quadruped, peculiar to the n. of Chili. The opossums of North A. were the first known of marsupial quadrupeds—i.e., those which have a pouch for their young—and are described as objects of great curiosity by the earlier writers on the new world and its productions. Monkeys are numerous in the warm parts of the new world as well as of the old, and of many species; but they are not only of different species from those of Asia and Africa; they form a different section of the monkey family. There are no apes resembling the orang-outang or chimpanzee, and no baboons; but all of the American monkeys have long tails, and many of them prehensile tails, the latter peculiarity being found in none of those of the old world. The absence of cheek-pouches is another character of the American monkeys.

Among the birds of A. are eagles and others of the same family, vultures (among which is the great condor of the Andes), owls, ravens, crows, herons, thrushes of many kinds (of which the mocking-bird may be mentioned as a species particularly interesting), finches, sparrows, buntings, warblers, wrens, larks, etc. Few, however, are identical in species with those of Europe or of Asia. Few things in the natural history of North A. are more remarkable than its multitudinous flocks of pigeons. There are numerous species of grouse and partridge. Of the large gallinaceous birds, the first place in importance must be assigned to the turkey, now so common in a domesticated state in Europe, although in a wild state it has almost disappeared from great part of its native regions. Alectors and curassoes are large gallinaceous birds of Mexico, Guiana, and other warm parts of A. Parrots abound in the tropical forests, and although only one species extends northward into the United States, yet in South A., birds of this family range to the southern extremity of the continent. Humming-birds are peculiar to A., and are found not only in its tropical but in its temperate regions, of numerous species, and many of them of dazzling beauty, passing like bees from flower to flower, and often constituting a characteristic feature of the scenes in which they abound. Toucans and aracarís are among the other kinds of birds peculiar to A., and are found in South A. alone. Swans, geese, and ducks, with other water-fowl of many kinds, exist in great numbers in North A., and in the warmer parts the brilliant colors of the flamingo enliven some of the coasts.

Serpents are numerous. Among them are boas, remarkable for their great size. Rattlesnakes, the most venomous and dreaded of the serpent tribe, are peculiar to A. Alligators abound in the rivers of the tropical and sub-tropical regions. Turtles are caught in great numbers in the W. Indian seas, and fresh-water turtles abound in some of the tropical rivers. The bull-frog is a native of the United States, remarkable for the loud noise which it makes, and which those who have been accustomed to it from their childhood learn to associate with all that is pleasant in nature. The lakes and rivers of A. abound in fish, of which many are of the salmon family, the common salmon itself being found as far s. as 41° n. lat., and some are of the sturgeon family. The cod-fisheries of the bank of Newfoundland and of the coasts of Nova Scotia are unequalled in productiveness; and herrings, and other species of the herring family, are taken in great numbers in the same seas.

Some parts of A. are grievously infested by mosquitoes and other insect tribes, the vast numbers of which are extremely annoying, so that some places on the banks of tropical rivers are rendered almost uninhabitable. Ants and termites, or white ants, are very abundant in some parts of South A. Many species of wild bees are found in the forests, and some of them are very productive of honey; but the common hive-bee was unknown in A. till it was introduced from Europe. It has now become naturalized, and is found in the forests far beyond the settlements of white men. The cochineal insect of the opuntia is a native of Mexico and Central A., and the plant on which it feeds has long been cultivated there and in the West Indies for its sake.

Political Divisions.—The following are the chief political divisions of A., each of which will be described in its proper place. In North A., strictly so called, are British A. as commonly understood, the United States, and part of Mexico. In Central A. are the remainder of Mexico, Central A., in its political sense, comprising Guatemala, San Salvador, Honduras, Nicaragua, and Costa Rica; and, lastly, a small portion of the United States of Colombia. In South A. are the rest of Colombia; thence along the Pacific are Ecuador, Peru and Chili, including Araucania; while round on the eastern side the Atlantic washes the Argentine Republic, Uruguay, Brazil, Guiana, and Venezuela—the interior being occupied by Bolivia and Paraguay. Finally, the West Indies consist of the Bahamas, the Greater Antilles, and the Lesser Antilles.

The annexed tables are compiled from the *Almanach de Gotha*, the *Statistical Abstract* for the British colonies and other possessions and the *Statesman's Year-Book* (1896), and the United States census report for 1890.

1. GOVERNMENTS OF NORTH AMERICA.

GOVERNMENTS.	Area in Square Miles.	Population.	Capitals.
Danish America (Greenland), 1890.....	46,740	10,516	Lichtenfels.
French Possessions (St. Pierre and Miquelon), '92....	93	6,250	St. Pierre.
British North America—			
1. The Dominion of Canada, comprising the prov- inces of			Ottawa.
Canada East, or Quebec, '91.....	228,900	1,488,535	Quebec.
Canada West, or Ontario, '91.....	222,000	2,114,321	Toronto.
Nova Scotia, '91.....	20,600	450,396	Halifax.
New Brunswick, '91.....	28,200	321,263	Frederickton.
Manitoba, '91.....	73,956	152,506	Winnipeg.
British Columbia, '91.....	383,900	98,173	Victoria.
Territories and Arctic Islands, '91.....	2,497,427	98,967	
Prince Edward Islands, '91.....	2,000	109,078	Charlotte Town.
2. Newfoundland and Labrador.....	42,200	202,040	St. John's.
3. Bermudas, 1893.....	20	15,519	Hamilton.
United States of America, '90.....	3,606,707	62,644,251	Washington.
Mexico, est. 1895.....	767,005	12,570,195	Mexico.
San Salvador, est. 1894.....	7,225	803,534	San Salvador.
Nicaragua, est. 1895.....	49,200	420,000	Managua.
Honduras, '89.....	43,000	396,048	
Guatemala, est. '95.....	63,400	1,800,000	Guatemala.
Costa Rica, est. '92.....	23,000	266,161	
Total.....	8,104,973	83,967,753	

2. WEST INDIAN GOVERNMENTS.

Hayti, est.....	10,204	960,000	Port au Prince.
Dominican Republic, est. '88.....	18,045	610,000	San Domingo.
Spanish—			
Cuba, '90.....	41,655	1,631,687	Havana.
Porto Rico.....	3,550	806,708	San Juan.
British—			
Jamaica, est. '94.....	4,200	672,762	Kingston.
Trinidad, est. '94.....	1,754	227,215	Port of Spain.
Barbadoes, est. '94.....	166	186,000	Bridgetown.
Grenada, est. '94.....	133	57,692	St. George's.
St. Vincent, '91.....	122	41,054	Kingston.
Tobago, annexed to Trinidad, Jan. 1, 1889, est. '94..	114	20,000	Scarboro'.
St. Lucia, est. '95.....	233	45,906	Castries.
Antigua (with Barbuda and Redonda), '91.....	108	36,819	St. John's.
Montserrat, '91.....	32	11,762	Plymouth.
St. Christopher, } Nevis, and } Anguilla }	150	47,662	Basseterre.
Virgin Islands, '91.....	58	4,639	Charlestown.
Dominica, '91.....	291	26,841	
Bahama's and Turk's Island.....	5,619	53,000	Roseau.
French—			
Guadalupe and Dependencies, est. '94.....	583	167,000	Naseau.
Martinique, est. '95.....	381	187,692	Basseterre.
Dutch—			
Curacao, including St. Martin's (s. side) and several other islands, '93.....	403	46,987	St. Pierre.
Danish—			
St. Croix, '90.....	74		Wilhelmstadt.
St. Thomas, '90.....	23	32,786	Christiansted.
St. John's, '90.....	21		
Total.....	87,919	5,874,212	

3. GOVERNMENTS OF SOUTH AMERICA.

Venezuela (1891).....	583,943	2,323,527	Caracas.
United States of Colombia, est. '81.....	504,773	3,878,600	Santa Fé de Bogota.
Ecuador.....	120,000	1,270,000	Quito.
Peru, '76.....	463,747	2,971,844	Lima.
Bolivia, est. '93.....	567,360	2,019,549	Chuquisaca.
Argentine Republic, '95.....	1,125,086	3,952,990	Buenos Ayres.
Uruguay, est. '94.....	72,110	822,892	Monte Video.
Paraguay, est. '95.....	91,970	432,000	Asuncion.
Chile, est. '94.....	293,970	2,963,687	Santiago.
Brazil, '90.....	3,209,878	14,068,268	Rio de Janeiro.
Guiana (British), '95-6.....	109,000	283,278	Georgetown.
Guiana (Dutch) or Surinam, '93.....	46,060	62,469	Pamararibo.
(pop. given exclusive of negroes.)			
Guiana (French), est.....	46,850	22,714	Cayenne.
Falkland Islands, '95.....	7,500	1,953	Port Louis.
Total.....	7,242,247	35,073,771	
Grand Total of America.....	15,435,139	124,915,736	

AMERICA, BRITISH. From the small beginnings specified in the general article above, British A., in the proper sense of the words, is now, by 10,000 sq. miles at least, larger than the American republic, and more extensive than any other state in the western hemisphere—occupying, as it does, a breadth of about 90° of long., and stretching, with more or less interruption, over a length of 120°. Besides touching, actually or virtually, every considerable power on the continent, England, in the new world as in the old, commands nearly every turning-point in navigation and commerce. In co-operation with Ireland, Newfoundland has linked together the two continents by submarine telegraph. Again, with the gulf and river of St. Lawrence as its main artery, British A., in its ordinary acceptation, comprising Nova Scotia, New Brunswick, Prince Edward Island, and the Canadas, confederated in one "Dominion," has received from nature extraordinary advantages in respect to the western trade; Halifax, the Bermudas, and the Bahamas, are so many guardians of the gulf stream, freighted as it is with the exports of half a continent. Jamaica forms the first link of a chain which girds the Caribbean sea; Trinidad fronts the Orinoco, which is connected by the Cassiquiare with the Amazon; western Guiana, also, as already mentioned under another head, finds, up the Essequibo, its own communication with the "king of waters"; and, lastly, on the Atlantic side, the Falklands, with their Port Egmont, flank alike the river Plate and the strait of Magellan. Round, again, in the Pacific, British A. exerts an influence which is perhaps relatively greater. At the upper extremity of a coast which is, as a whole, singularly deficient in harbors, British Columbia, with its breastwork of islands from Vancouver's upwards, and its succession of indentations, bids fair, more especially with its inexhaustible supplies of magnificent timber, to form an admirable base of operations for sustaining the maritime greatness of Britain.

AMERICA, RUSSIAN, the name long given to what is now a territory of the United States, called *Alaska*, and which was purchased from the Russian government in 1867 for \$7,200,000. It forms the north-western extremity of the American continent, and is bounded n. by the Arctic Ocean, e. by British America, w. and s. by the Pacific. It was discovered by a Russian expedition conducted by Behring (q. v.), which sailed from Kamchatka in 1741. It was little better than a vast hunting-ground, and was long held by the Imperial Fur Company, which differed but little from the imperial government itself. Its principal town is New Archangel (now called Sitka), on the island of Sitka. The most noticeable points in geography are cape Prince of Wales, on Behring's strait; Kotzebue's sound, Norton's sound, peninsula of Alaska, Cook's inlet, and mount St. Elias. See ALASKA and UNITED STATES.

AMERICA, SPANISH. Spanish A. is now shrunk into Porto Rico and Cuba, and belongs rather to history than to geography. Yet for many years it embraced nearly all South and Central A. and much of North A. The colonists, by becoming hunters after the precious metals, instead of agriculturists, and by the exclusion of all but natives of the mother country from public employment, caused its decay.

AMERICAN ALOE. See AGAVE.

AMERICAN BIBLE SOCIETY. See BIBLE SOCIETY, AMERICAN.

AMERICAN BLIGHT. See APHIS.

AMERICAN ECLECTIC, or **NEW SCHOOL OF MEDICINE,** began to be known about 1825 as distinct from the regular school, and in 1826 there was an eclectic college founded in New York by Wooster Beach, who was the author of several text books for the school. Soon afterwards schools were established in Ohio and other states, and at a later period regular colleges in New York, Chicago, and other cities. State societies were formed, and in 1870 the National Eclectic Medical Association was incorporated by the New York legislature. In 1897 there were 22 eclectic medical colleges, with approximately 750 students. The school flourishes also in the British Provinces, and there is an eclectic association in England. The prominent feature of the school is the rejection of mercury and most other minerals in medicine, and the extension of simple hygienic treatment in disease, depending more upon the vital powers than upon extraneous aid. In place of minerals rejected they claim to have added a hundred or more to the list of vegetable medicines.

AMERICAN FEDERATION OF LABOR, THE, is an organization having for its object, a free federation of all trade and labor unions in America; the establishment of self-governing unions of wage workers in every trade and legitimate occupation, without exception, where none now exist; the formation of public opinion by the agencies of platform, press, and legislation; and the furtherance of a civilization based upon industrial progress, by securing to the toilers a reduction in the daily hours of labor. The National Labor Union, the prototype of the present Federation, was founded at a convention of delegates from sixty labor unions, held in Baltimore, Aug. 20th, 1866. A reorganization took place at Pittsburgh, Pa., Nov. 15th, 1881, at which the name of the Federation of Organized Trades' and Labor Unions of the United States and Canada was adopted. At the convention held in Columbus, Ohio, December 8th, 1886, the old Federation was dissolved, and the organization under its present form and name came into existence. In 1897, the total membership of the Federation was estimated at 620,000.

AMERICAN FLAG. On the 14th of June, 1777, the continental congress resolved that the flag of the united colonies should show 13 stripes of red and white alternating, to represent the number of the colonies, with 13 stars in a blue field. This became the flag of the United States, and a star is added for every state added to the union. The blue field or union is square, and has the width of seven stripes. The U. S. Revenue flag has 16 vertical stripes, alternately red and white, with a white union bearing the national arms in dark blue.

AMERICAN HISTORICAL ASSOCIATION. See HISTORICAL ASSOCIATION, AMERICAN.

AMERICANISMS, words and phrases peculiar to the United States, are classified by one writer on this subject (Bartlett) as follows: 1. Archaisms, obsolete, or nearly so, in Great Britain. 2. English words used in a different sense. 3. Words used in the original sense in the United States although not in Great Britain. 4. English provincialisms adopted into general use in America. 5. Newly-coined words owing their origin to productions or circumstances of the country. 6. Words derived from European languages, especially the French, Spanish, and Dutch. 7. Indian words. 8. Negroisms. 9. Peculiarities of pronunciation. Accepting for the present this arrangement, substantially that of most American and English writers, we may cite as examples of archaisms, *fall*, for autumn, *freshet*, to *lam*, in the sense of to beat, to *scuelch*, and to *tarry*. These are only a few, for an American philologist has stated that of the words, phrases, and constructions found in the Bible and Book of Common Prayer, "about one-sixth, which are no longer used in England in ordinary prose-writing, would apparently be used without thought or hesitation by an American author." Among the many English words used in a different or perverted sense are *barn* for stable; *boards*, for deals; *buggy*, a four-wheeled vehicle,—in England, two-wheeled; *calico*, printed cotton, in England means unprinted; *clever*, for good-natured,—in England, generally, good-looking or skillful; *corn*, for maize, whereas in England it means wheat, in Scotland, oats, and in Ireland, barley; *cracker*, for biscuit; *depot*, for station; *dress*, for gown; *forehanded*=well-to-do, in England, means timely, early; to *guess*, for to suppose or conclude; *hack*, a hackney coach,—in England a hired horse; *homely*=plain-featured,—in England, home, like or unadorned; to *jeu*=to haggle,—in England, to cheat; *likely*, for promising; *lumber*, for timber; to *mail*, for to post; *notify*=to give notice,—in England, to make known; *pond*, a natural pool of water,—in England, artificial; *reliable*, for trustworthy; *saloon*, for bar-room; *smart*, for talented; *smudge*, a smouldering fire used to drive away insects,—in England simply an overpowering smoke; *store*, for shop; *tavern*, for inn (a tavern in Great Britain provides no lodgings); *temper*, with us meaning passion, in England control of passion; *ugly*, for ill-natured; *venison*, deer's flesh,—in England, meat of any wild animal; *vest*, for waistcoat. We use also, in large number, different words for the same thing, as *conductor*, for guard; *editorial*, for leader; *elevator*, for lift; *horse-car*, for tram, and *sleepers*, for tie.

Examples of words retaining here their old meaning are: *fleshy* in the sense of stout *offul*, the parts of a butchered animal not worth salting, *sick*, in the sense of ill, and *wilt*, in the sense of wither. On the other hand, *to heft*, meaning with us, to weigh by lifting, keeps, in England, its original meaning, to lift. Many words called archaic or provincial by English writers, are widely current among Americans both in speech and literature—among them, *adze*, *affectation*, *angry* (wound), *andiron*, *bay-window*, *bearer* (at a funeral), to *blaze* (a tree), *burly*, *cesspool*, *clodhopper*, *counterfeit money*, *cross-purposes*, *deft*, *din*, *hasp*, *loophole*, *ornate*, *ragamuffin*, *shingle*, *stand* (speakers), *stock* (cattle), *thill*, *toady*, *tramp*, *truck*, and *underpinning*. Among newly-coined words and expressions are these, showing plainly their origin on the frontier or in the forest: *backwoods*, *cache*, *clearing*, to *draw a bead*, to *fight fire*, a *gone con*, *hogwallow*, *logging camp*, *prairie schooner*, *raft* (of dead trees), *squatter*, *squaw-man*, the *timber*, and *trapper*. Ranch life has given us such words as *corral*, *cowboy*, *roundup*, and *stampede*; the mining regions, *bed-rock*, *diggings*, to *pan out*, to *prospect*, and to *stake a claim*. From the farm and plantation we have obtained among others, *bagasse*, *broom-corn*, *Hessian fly*, *Indian meal*, and *truck patch*; while trade has supplied us with *bogus*, *drummer*, *posted up*, and to *settle* (a bill). Our political terms and phrases include the following, most of which are the subject of special articles in the *Cyclopædia*: *Agricultural-wheel*, *barnburner*, *bloody shirt*, *boodle*, *buncombe*, *carpet-bagger*, *caucus*, *copperhead*, to *eat crow*, *dark horse*, *doughface*, *fence-riding*, F. F. V.'s, *filibuster*, *fire-eater*, *gerrymander*, *hunker*, *jayhawker*, *ku-klux-klan*, *loco-foco*, *log-rolling*, *Lynch law*, *mugwump*, *omnibus-bill*, *pipe-laying*, *plank*, *primary*, *reconstruction*, *salt river*, *shin-plaster*, *squatter sovereignty*, *Tammany*, *wire-puller*, *Yazoo fraud*.

Words derived from foreign languages are numerous, and one philologist (W. W. Crane) asserts that, though few are intelligible to English people, they are more extensively used by us than is generally supposed, and "form the really distinctive features of what may be termed the American language." Thus from the Spanish we have in corrupted or contracted form, *creole* (*criollo*), *garrote* (*garrota*), *jerked beef* (*charqui*), *key*, a small island (*cayo*), *lasso* (*lazo*), *mustang* (*mesteno*), *pickaninny* (*pequeño niño*), *Sambo* (*Zambo*, a person of negro and Indian blood); *stampede* (*estampedo*); and such literally appropriated words as *adobe*, *bonanza*, *cañon*, and *mesa*. From the French have been obtained among many, *bayou* (*boyau*, a trench), *cache* or *cash* (*cacher*), *chowder* (*chaudière*), *chivaree* (*charivari*), *metif*, an Indian half-breed (*métif* or *métis*), *octoon* (*octavon*), *quad*

coon (*quartern*, a person one-fourth negro), and the identical *butte*, *levee*, *portage*, *prairie*, and *voyageur*. From the Dutch have come *boss*, an overseer or superior (*baas*); *cold slave*, cabbage salad (*kool slaad*); *cruller* (*kruller*), to twist; *hook*, a point of land (*hoek*, a corner); *noodles*, an imitation of macaroni (*noodlejees*); *overslough*, to supersede or defeat (*over-slaan*; to skip or pretermit); *stoop* or *stoup*, the step or steps of a house (*stoep*). *Kill*, a small stream, retains both its old sound and spelling, and *Santa Claus* (*Klaas*) receives as much respect as before the slight change in his name. The Germans have contributed *bummer* (*bummeler*, a braggart, a wanderer); *loafer* (*läufer*, an unsettled or irregular person); and probably *jillipeen*, philopena (*vielliebchen*), and *dude*.

From the Indian we have *chinquapin*, a kind of oak (Va. Algonquin, *che-chinenamin*); *esquimaux* (Kenisteno, *ashkimac*); *hominny* (Va. Algonquin, *ustathominy*); *moccason* (Mass. Algonquin, *mockisin*); *oppossum* (*apassam*); *poro-wow* (*porcan*, a prophet or conjuror); *racoon* (Algonquin, *aroughcun*); *sachem* (*sakemo*); *skunk* (Abenakis, *secanau*); *succotash* (Nanahaganset, *mesicmotash*); *toboggan* (*odabogan*); *tomahawk* (Algonquin, *tamahagan*, a war-club); *wigwam* (Natic, *weccwahm*). Among words introduced or invented by the southern negroes are: *brottus*, a small gift (Ga.), *buccra*, a white man; *corn* (harvest) *songs* (Md.); *cracklings* or *goody-bread*, bread containing roasted pork-rinds; *enty*? is that so? (Sea Islands); *fandango*, said to have been brought to the Spanish West Indies from Guinea; *goober*, a peanut (W. African *guja*, or Guinea *gobbe-gobbe*, Va. and N. C.); *lagnappe*, a tradesman's gratuity (Sp., *fiapa*, La.); *moonack*, a mythical animal; *pickaninny*, and *pinder*, a peanut (Fla.); while the Chinese word *koutow* or *kotow*, salutation by prostration, has (or had) a limited use in the sense of obsequious politeness.

In the matter of pronunciation, slight differences exist. The word *trait*, for instance, is pronounced *tray* by the English, the *i* in *sliver* is lengthened by them, and *schedule* is commonly pronounced *shedule*. We may mention here that *cheerful* retains in some parts of the South its old pronunciation, *cherful*. What have been termed by Grant Allen "Americanisms in spelling," examples of which are *labor*, *offenses*, and *theater*, are undoubtedly the result of the extensive use of Webster's spelling-books and dictionary.

Another writer (Reeves) makes the following division: 1. Eastern dialects. 2. Southern. 3. Western. 4. Pacific or mining, and adds as a possible 5, English-Dutch of Pennsylvania. This convenient arrangement enables us to separate such words and phrases as are limited to particular sections or localities (provincialisms) from those that may be called national. Beginning with New England, we have: to *admire*, for to like, e.g., "I should admire to go;" to *allot*, or 'lot, for to purpose; *barm*, for yeast; *be*, for are or were; *bettermost*; *blob*, a blossom; *blowth*, blossoming time; *bungtown* copper, a counterfeit; to *calculate*, for to conclude or suppose; to *coast*, for to slide down hill; *emptin's*, lees of yeast; to *fail up*; to *fay*, for to fit; *fore-chamber*, a front bedroom (Me.); *gawnicus*, a dolt; *grayslick*, a glassy stretch of water (Me.); *Hessian*, as a term of reproach; *like*, without a specified object, as, "How did you like?" (a place, person); *long-favored*, tall; *man*, for husband; *mush-muddle*, a potpie (Cape Cod); *pew-cart*, a box-like carriage (Nantucket); *pleasant*, for pleasing; *pokeloken*, a marsh (Me.); *priest*, for a minister of any denomination; *pung*, a kind of sleigh; *rifle*, a whetstone for scythes; *sconce*, for discretion; to *seep*, to pour through a sieve or hole; *ship*, for pew; *spero*, a commonplace entertainment, "small doings" (Vt.); *staddle*, a sapling; *suant* or *suent*, level, uniform; to *sugar off*, to boil maple syrup down until it grains; *tackling*, for harness; *timbers*, for skeleton of a whale; *torsh*, the youngest child (Cape Cod); to *train*, to move briskly (like the militia on "training day"), to frolic; *vestry*, the chapel or "lecture-room" of a non-liturgical church; *vige*, for voyage; *wopper* (or *whopper*) *jauned*; *wicket*, a hut or shelter of boughs (Me.); *winegar*, for vinegar (Essex co., Mass.); *York shilling*, ninepence. In New York state, among localisms derived from the Dutch, are *bockey*, a gourd-dipper; *fyke*, a bow-net; *hoople*, a child's hoop; *pile*, an arrow, and *scup*, a swing, a name still used by children of foreign parentage on the "east side" of New York City. *Slip*, an opening between wharves, is apparently an indigenous English word; the provincial English *duff*, dough or paste, signifies, in the Adirondacks, fallen and matted hemlock needles, and *dimpy* (probably from the English *dimpsey*, a kind of preserve) is the name given in some places to a tea-party, or a small social gathering at which refreshments are served. New Jersey, settled, like New York, both by English and Dutch, preserves in remote localities some old-world words, or perversions of the same; for example, *bliekie*, a tin pail; to *heir to*, to inherit; *jag*, a small load; *muw*, disorder, and *piece*, a cold meal hastily prepared, or one for farm hands. Examples of the provincialisms of Pennsylvania, which were introduced by the English, Scotch-Irish, and Germans, and in many instances have been carried beyond her borders by emigration, are: *after-night*, for after candle-light; *Aprile*, for April (Cumberland Valley); *barrick*, a hill; *beating*, for suppurating; *brickle*, for brittle; *dipsy*, the sinker of a fish-line; *dozy*, timber brittle from decay; *fouty*, for trifling; to *get shut*, for to get rid; *gums*, for overshoes (eastern Pa.); *horsebeast*; to *lift*, a collection in church, for to take up; *once*, for immediately; *outcry*, for public auction; to *redd up*, to tidy or arrange; *riffles*, for ripples; *scrapple*, an article of food; *slave*, a fierce dog, i.e., needing to be chained (western Pa.); to *smouch*, for to kiss; *sots*, common yeast; to *top* (a candle), for to snuff; to *threat*, for to argue; *yammer*, a whine or whimper.

The South has retained fully as many old English words and pronunciations as New England, and has originated some of the most expressive terms used in ordinary con-

versation, a number of which, by emigration, have been domesticated in the West and on the Pacific coast. Among them are *afear'd*, for afraid; *ambia*, expectoration produced by chewing tobacco (Va., Carolina); *beast*, for horse; *branch*, for a stream of any size; *bucket*, for pail; *brogan*, a kind of boat (Chesapeake Bay); *castaway*, for overturned; *central*, for central (Va.); to *chunk*, to throw a missile; *coppin*, for cowpens; *complected*, having a certain kind of complexion; *condeript*, thrown into fits (Ky.); *corn-dodger*; *cracker*, a poor white (Ga., Fla.); *dinghy*, a kind of row-boat (Fla.); *dismal*, a swampy tract of land (N. C.); *docious*, for docile; *donock*, or *donnock*, a stone (Southwest); *escalan*, a kind of coin (La.); *feaze* or *feeze*, an excited state; *fice* or *phyce*, a worthless cur; *French*, anything distasteful (Va., Md.); *grumpy*, for groundpea (Tenn.); *gum* or *bee-gum*, a hive made from a hollow tree; *gumbo*, okra, or a dish made of it; *gumbo*, a patois; *hammock* or *hummock*, a peculiar kind of land, often hilly (Fla., Tex.); *holpen*, for helped; *honey-fogling*, for cheating or coaxing; *hot*, for hit; *human*, for person; *Jeames*, for James (Va.); *kiver*, for cover; *lane*, for any enclosed road; *lightwood*, pine chips or knots; *marooning*, picnicking or traveling by carriage; *mammoxed*, seriously injured; *marvel*, for marble; *maverick*, an unbranded yearling (Texas and Southwest); *million*, for melon; *needcessity*, for necessity; *or'nary*, for contemptible; *paint*, a spotted horse; *pear*, for lively, brisk; *pine-tag*, for pine needle; *a polt*, for a blow; *pone*, bread of Indian meal; *powerful*, for very; *quarters*, farm buildings or out-houses inhabited by negroes; *rance sniffle*, a malignant act (Ga.); *rantankerous*, for quarrelsome (Ga.); to *reckon*, for to suppose or conclude; *rock*, for stone; *roustabout*; *savigrous* or *survigrous*, fierce, alert; *slash*, low ground or an opening in the woods; *smart*, for great or considerable; to *seringe*, for to flinch (Tex.); *skygoddlin*, obliquely (Tex.); *swash*, a narrow channel of water; *lackey*, for neglected or forlorn; to *tarrify*, for to coerce; to *tote*, for to carry; *trash*, worthless or low-born persons; to *up*, used as a verb; *used*, for used to; *wain*, for wagon (Md.); *you-uns*, for you. The West, using the term in its old sense, which included the interior states as well as the northwest and southwest, in addition to words derived from the French and Spanish, some of which have already been cited, has brought into its vocabulary many peculiar words and expressions. Such are *after-clap*, a demand made after a bargain is closed; *Arkansas toothpick*, a kind of bowie-knife; *bad man*, for a murderer; *bell mare*, the horse leading a drove of mules (Southwest); to *bear off*, to separate a stray "brand" by riding between it and the herd (Southwest); *bodewash* (*bois de cache*), dried cow-dung used as fuel (Southwest); to *build*, for to make shoes (Ohio); to *buss*, for to strike; *catavampous* or *catavampitious*, for terribly or completely; *country*, for state or section; *cowbrute* (Mo.); *doggery*, a grogshop; *drink*, for river; *galoot*; to *take a gird*, for to make an effort; to *hustle*; *keener*, a sharp man; *lave!* (*lève*), get up! or rise up! (Mississippi Valley); *locoed*, for frenzied (Kansas and Southwest); *long sweetening*, for molasses (Iowa, from New England); *main traveled road*, for highway; *naked possessor*, one without title to his farm (Southwest); *oldest*, for oldest; *plumb sure*; to *pull foot*=to hasten; to *raise*, for to obtain; *robblloe*, pemmican boiled with flour and water (Northwest); to *slosh 'round*, to brag, also to frequent saloons (South and West); *sugar* or *sugar-tree*, for maple; *sun-up*, for sunrise; *swinger*, the middle horses in a team of six; *tenderfoot*, a new-comer; to *trash* (to cover) *a trail*; *every whipstick*, for continually, often; *worm* (or snake) fence; to *zit*, to sound like a bullet striking the water. The Pacific slope is responsible for *adobe*, soil from which *adobe* bricks are made; to *bach*, to camp out without ladies (Cal.); *Bostons*, white men in general (Or. Indian); *coulée*, a rocky valley (Or.); *claim*, land to which one has a legal right; *claim-jumper*, one who forcibly takes another's claim; to *coyote*, to sink a small shaft (Cal.); *diggings*, a particular locality; *hardpan*; *heeled*, for armed; *pay-streak*, a profitable lode or vein; *rusher*, a person going to the mines; *tanglefoot*, bad liquor.

Early writers on Americanisms were wont to stamp every odd or vulgar word and expression as American, with the lamentable result, as Richard Grant White complained, of creating a belief that there is a distinctive American language, "a barbarous, hybrid dialect, grafted onto English stock;" the truth being that most of the so-called Americanisms were brought to this country by its early settlers, English, Scotch-Irish, Dutch, Germans, etc., and that many of them are now used only by the unlettered. The language of the "Stage Yankee," and that of the characters in dialect-stories, northern and southern, is with few exceptions English; provincial, or obsolete in the mother country, and not "American" in the true sense of the word. In the county of Suffolk, according to Lounsbury, the following "Americanisms" were current as recently as 1823: *Apple-fritters*, by gum, *chaw*, *cute*, *darnation*, *gal*, *gawky*, *hoss*, *ninny-hammer*, *ride like blazes*, *saace* (sauce), *sappy*, and *tantrum*. White prepared a long list of words and phrases supposed to be indigenous, and proved their British origin by citing early dates at which they appear in literature, or the names of authors in whose works they occur. Selecting from this and indicating by the letter "a." words known to be ancient, by "m." such as are still used in provincial speech, and by "Bible," King James' version, we submit the following: to *admire*, in the sense of to wish eagerly (Chapman's *Homer*, 1655); to *advocate* (Milton); *apart*, for aside (Bulwer); *baggage*, for luggage (Fielding, T. Hughes); *blizzard* (m.); *blow*, for boastful talk (a. m.); to *bolt*, for to rush or escape (Dryden); *bosom*, applied to a man (Shakespeare); *bull-doze* (W. Scott); *bureau*, for chest of drawers (Fielding, Hare); by *the skin of one's teeth*

(Bible); *catamount* (a.); *chaw* (1530, m.); *chore*, light work (Ben Jonson); *clean gone* (Bible); *clever*, for good-natured (Elizabethan writers); *conclude*, for resolved (Tyndale, Froude); *crevasse* (Chaucer); *deck of cards* (Shakespeare); *divine*, for clergyman (W. Scott, G. Eliot); *elect*, for conclude or determine (Lord Thurlow, Ruskin); to *enjoy poor health* (m.); *fall*, for autumn (Cairne, 1553; Froude); *feel to*, as in the expression, "I feel to rejoice" (m.); to *fellowship* (Chaucer); *fix*, to put in place or order (Farquhar, Sterne); *fleshy*, for stout (Chaucer, Prof. Owen); *folks*, for people (Byron, Bulwer Lytton); *gent* (Pope); *a good time* (Swift); *grain*, for all cereals (Wycliffe); *guess*, for think or suppose (Wycliffe, Milton, A. Trollope); *gumption* (a. m.); *heft* (Sackville, T. Hughes); *help*, for servant (T. Hughes); *human*, for person (Chapman's *Homer*); *hung*, for hanged (Shakespeare, C. Reade); to *hustle* (a.); *illy* (a. m.); *influential* (W. Thompson, abt. 1760); *improvement*, of an occasion, etc. (Defoe, Gibbon); *institution* in the sense of an establishment or foundation (Beatty, 1784; Trollope); *interview*, to meet for conversation (Dekker); to *let on*, for to divulge (m.); to *let slide* (Gower); *limb*, for leg (Fielding); *love*, for like (Cowper); *lucrative* (Bacon); *mad*, for angry (Bible, Middleton); *magnetic* as an adjective (Donne); to *make a visit* (m.); *metropolis*, the chief city of the state (Milton, De Quincey, Macaulay); *million*, for melon (Pepys); *musicianer* (Byron); *nice*, pleasing or agreeable (a. m.); *notify*, to give notice (m.); *notions*, for small wares (Young); *overly*, for excessively (m.); *parlor*, for drawing-room (G. Eliot, Helps); *peruse*, for scan or read (W. Scott); *professor* of religion (Milton); *pumpkin* (pumpkin pie (1655); *quit*, for leave off (Ben Jonson); *railroad*, for railway (J. H. Newman, Mrs. Trollope); *rare*, for underdone (Dryden); *reliable* (Richard Montagu, 1624; Gladstone); *reckon*, for suppose or conclude (Bible, W. Scott); *rock*, for stone (a.); *run*, a small stream (a.); *sick*, for ill (Bible, Evelyn); *skedaddle* (m.); *slick* (a.); *span new* (Chaucer); *spell*, a period of time (a.); *spruce*, for neat (Evelyn); *spunky* (Burns); *swop* (B. Jonson, Dryden); to *take on*, for to wait or grieve (a.); *tend*, for attend (Shakespeare); *town* as a geographical division (Wycliffe); *well*, prefacing a sentence (Disraeli); *whittling* (Walpole); and the writer would add the following, which are sometimes ridiculed as outlandish products of the new world: *a howling wilderness* (Bible); *Mr. — and lady* (Thackeray); and to *set store by*, in the sense of to prize or appreciate (Mrs. Oliphant). Gilbert M. Tucker says that the 460 words in Elwyn's *Glossary of Supposed Americanisms* are all of British origin; that in Pickering's work (1816) not more than 70 words out of the 500 are really American; and that out of the 5000 or more entries in Bartlett's *Dictionary* only about 500 are genuine and distinct Americanisms now in decent use. Most New Englanders, said James Russell Lowell, speaking of colloquialisms still heard in Massachusetts, stand less in need of a glossary to Shakespeare than many a native of the old country. It may be added that many words formerly termed Americanisms are as commonly used in England as here, though not in polite speech or literature, such as *bamboozle*, *chockful*, *duds*, and *sight* for number, while, on the other hand, such old forms as *axe* for ask, and *housen* for houses, are frequently heard in England, and rarely here.

Richard Grant White and Prof. Thomas R. Lounsbury limit the term Americanisms narrowly. According to the former, they must not have been transplanted, but must be perversions or modifications of English words or phrases, and must be used in the current speech or literature of the United States at the present day. "Words which are the names of things peculiar to this country are not Americanisms except under certain conditions (*maize*, *squaw*, *wigwam*). They are merely names which are necessarily used by writers and speakers of all languages. If, however, any such word is adopted here as the name of a thing which already had an English name (*wigwam*, for hut; *squaw*, for wife), it then becomes properly an Americanism. *Indian*, and names compounded of *Indian*, were given by Europeans. *Indian pudding* is an American thing, but its name is not an Americanism." As he rejects *Indian Summer*, *paleface*, *succotash*, *tomahawk* and the rest, White asks, "What have we to do with the Indian?" and proceeding, crosses from the list of cherished "Americanisms," *broncho*, *lacrosse*, *stampede*, and their kin; *abolitionist*, *border-ruffian*, *gerrymander*, *reservation*, etc., as well as *groundhog*, *long-moss*, *pine barrens*, and *saltlick*, to go no further, besides refusing to discuss such words as *interval* and *water-gap*, because they are "legitimate English." Lounsbury, like White, objects to the expression, "The American language," and remarks of the so-called "Yankee dialect" that it is never "the characteristic tongue of any one man, or of any one class, or of any one district." He doubts if the term "Americanisms" can be regularly applied to *cent*, *congress*, *mileage*, *nullification*, and so on, and prefers to call them "American contributions to the common language."

American newspapers are largely to blame for the mongrel and high-sounding words heard in the United States, especially those derived from the Latin and Greek. The oratory of political campaigns gives rise to not a few astonishing Americanisms, and our humorists have coined many more that are beloved of the public. Persons of fair education, who, as we learn from their talk, *engage in avocations*, *reside in a mansion*, *wear pants*, *donate* to charities, *ride to the metropolis in a smoker*, *retire to bed*, and have *proclivities*, must be expected to use also *enthuse*, *funeralize*, *landscapist*, *saleslady*, and *shootist*, when they find them in their favorite journals, but criticism under this head comes with little grace from the English, whose *leaderette* is as absurd as our *editorial paragraph*, and *agricultural laborer*, a clumsy name for him whom we term

a *farm-hand*. Our colleges, Yale in particular, are prolific in slang, some of which, as to *rattle*, in the sense of to confuse, soon become common property. Most of our colloquial expressions are short lived, but the following may be instanced as having been in use for a long period: to *absquatulate*; to *acknowledge the corn*; *baggage-smasher*; to *bark up the wrong tree*; *bottom dollar*; *caboodle*; to *boost*; to *carot*; *con-niption fit*; not to *care a continental*; a *continental darn*; to *chip in*; *coon*, for man; a *coon's age*, an indefinitely long time; to *dust*, for to leave quickly; to *euchre out*; to *flash in the pan*; *flatfooted*; *gum game*; *highfalutin*; *last o' pea time*; *level best*; to *liquor*; to *mosey*, to leave quickly; *obligated*; to *paddle one's own canoe*; to *pan out*; *pieayune*, small, mean; to *raise Cain*; *right away*; to *run*, in the sense of to manage or conduct; to *salt a mine*; *sample room*, for liquor-saloon; *shoddy*, applied to a person; to *smile*, to drink liquor; *sockdologer*, a finishing blow or argument; to *sour on*; a *square meal*; to *strike oil*, to get rich suddenly; to *stump*, for to puzzle, or challenge; to *talk turkey*, to brag; to *trampoose*, to wander aimlessly; *tuckered out*; to *vamose*, to leave quickly; to *weaken*, to yield or give out.

T. W. Higginson (see *Bibliography infra*), in examining a glossary of the slang used about 1798 by prisoners in the Castle in Boston harbor, now Fort Independence, discovered a number of words that had been classed as of recent origin, the most familiar of which are *grub*, victuals; *douse the glim*, to put out the light; and *spotted*, for found cut. Also some that are not given in any English glossaries, as *briar*, a saw; *nipping-jig*, the gallows; and *wibble*, a dollar.

In addition to words and phrases already given are the following, which appear to be peculiar or indigenous to the United States, and are recorded here rather according to Bartlett's classification than that of White: *Accountability*; *alienism*; *air line* (railroad); *backwoodsman*; *barbecue*; *basket-meeting*; *bedrock* (price); *bee* (sewing, spelling, etc.); to *belittle*; *bender*, a frolic; *black-jack*, rum and molasses; *block* (of houses); *bluff*, a hill or headland; to *board a train*; *boom*; *bounty-jumper*; *buzz-saw*; *camp-meeting*; *canaille*, shorts, or low grades of flour; *clambake*; a *clearing*; *darkey*, for a colored person; *deadfall*, fallen and tangled trees; *deadhead*; *disfellowship*; *dodger*, a small handbill; *donation-party*; *down East*; *dug-out*, a kind of canoe; *egg-nogg*; *everglade*; *fair*, an exhibition; *gale*, a pleasant excitement; *greenback*; *grip-sack*; *gubernatorial*; *Indian giver*, one who expects a gift returned; *institute* (teachers, etc.); *jumper*, a kind of sleigh; *lengthy*; *leece*, a reception at any time of day; to *lobby*; *logging*; *lining a bee*; *mudsill*; a *new departure*; *oval*, a ball-field; *patent-outside*, of a newspaper; *popcorn*; to *pre-empt*; *quite*, for very; *rapids*, in a stream; *sawyer*, a snag in a river; *section*, a division of land; *schooner*; *sinkhole*; *sleigh*; *snake fence*; *solid colored*; a *square* (of houses); a *suit of hair*; *teeter*, for tilter; *telegram*; *transom*, a window over a door,—in its original meaning, the lintel over a door; to *transpire*, for to happen; *vigilance committee*; *wigwag*, a building used for political speaking. *Yankee*, usually held to have been an attempt on the part of the Indians to pronounce the word *English*, is derived by a recent writer from the Dutch *Jantje* (pronounced Yantyea, and an equivalent of Johnnie), the nickname for the Dutch people. *Britisher*, according to White, is a Briticism, but this is doubtful, and his statement that it is never heard in the mouth of an American must be taken with caution. When we remember that the dialects of the counties in England have marked differences, so marked indeed that it may be doubted whether a Lancashire miner and a Lincolnshire farmer could understand each other, we may well be proud that our vast country has, strictly speaking, only one language. It is remarkable that the influx of European immigrants has not resulted in some states in reducing English to a patois, if not in extinguishing it, or in giving it scant room in a mongrel vocabulary. Again, it might reasonably be expected that in the course of three centuries, the political and social changes we have undergone, and the peculiar circumstances attending the settlement of new regions, would have separated us so widely from the mother country, that in spite of kinship and commercial and literary intercourse, some radical differences in language would have been evolved.

See John Witherspoon, D.D., essay in *The Druid*, 4th vol. (Phila., 1801); John Pickering, *Vocabulary of Words and Phrases supposed to be peculiar to America* (1816); James Russell Lowell, introduction to the *Biglow Papers* (1848); Alfred L. Elwyn, *Glossary of Supposed Americanisms* (1859); John Russell Bartlett, *Dictionary of Americanisms* (1850; 4th ed., 1877); Haldemann, *Pennsylvania Dutch* (1872); Schele de Vere, *Americanisms* (1872); Norton, *Political Americanisms* (1870); *A Dictionary of Slang, Jargon, and Cant*, with prefatory chapter by Charles G. Leland (Lond., 1887); George Gibbs, *Dictionary of the Chinook Jargon*; Leland, *Hans Breitmann's Ballads* (1870); Harris, *Uncle Remus, His Songs and His Sayings* (1880), and *Nights with Uncle Remus* (1883); Richard G. White, "Americanisms," *Atlantic Monthly*, vols. 41-45; Thomas R. Lounsbury, "The English Language in America," *International Review*, vol. 8; G. M. Tucker, "American English," *North American Review*, vol. 136; W. W. Crane, "The American Language," *Putnam's Magazine*, vol. 16; Rev. Henry Reeves, "Our Provincialisms," *Lippincott's Magazine*, vol. 3; Thomas W. Higginson, "American Flash Language in 1798," *Science*, May, 1885; Southwestern Slang, *Overland Monthly*, Aug., 1869; Brander Mathews, "Briticisms and Americanisms," *Harper's Magazine*, July 1891.

AMERICAN JOURNALISM is too important to be passed over without especial

notice. If in England the press can claim to be "the fourth estate," it is at least second in point of power and influence in the United States, where the only superior power is the people themselves. According to the census of 1890 there were published in the United States and territories 17,616 newspapers and magazines, an increase of 55.7% over the number reported in 1880. Of these as many as 1,731 were published daily; 12,721 weekly; 214 semi-weekly; 40 tri-weekly; 2,247 once a month; 271 once in three months. There were also 392 other periodicals published. The circulation for all classes of periodicals more than doubled in the decade 1880-90, being 2,067,848,209 in 1880 and 4,681,113,530 in 1890. The circulation of the individual newspapers varies widely, ranging from the few hundreds or thousands of the small local papers to the hundreds of thousands in the case of the great dailies in the large cities. The aggregate circulation of serial printed matter in the United States is immensely greater in variety, in extent, and in ratio to population, than in any other country. Of native born whites the proportion of such as cannot read is insignificant; and the universal reading of newspapers is one of the peculiarities that first strikes the attention of a stranger. Free and unabashed as the air, the newspaper penetrates every nook and corner, circulates in every office and warehouse, in every parlor and hovel, in the hotel and the railway car, in the prison and the church. In 1870, according to the best authority, there were 5871 newspapers and periodicals in the United States, and 7642 in all the world besides. We had, therefore, one newspaper to every 6525 inhabitants; leaving to the world outside an average of one periodical for every 200,000 inhabitants. In Hudson's *History of Journalism* it is estimated that the number of copies of newspapers printed in Great Britain in 1870 was 350,000,000, and the same in France. The census returns show that over 1,500,000,000 copies were issued in the United States in the same year. That is to say, for every printed sheet in Great Britain, or France, there were more than four printed sheets in the United States. This ratio is doubtless greater to-day.

And yet journalism in the United States is comparatively of modern growth. The oldest living newspaper in English is the *London Gazette*, begun in Nov., 1665; but the first English newspaper appeared over forty years before that (1622) when Nathaniel Butler issued his *Weekly News*. The oldest living newspaper, the *Frankfort Journal*, started in 1615. The very first newspaper in the United States was *Publick Occurrences*, issued in Boston, Sept. 25, 1690, by Richard Pearce for Benjamin Harris, and immediately suppressed by the government. Then came, April 24, 1702, the *Boston News-Letter*. In 1719 appeared in Boston the *Gazette*, and in Philadelphia the same year the *American Mercury*. In 1721 James Franklin started the *Boston Courant*, which lived under the care of Benjamin Franklin about six years. The *New York Gazette* started in 1725; the *Annapolis (Md.) Gazette* in 1727; the *Charleston (S. C.) Gazette* in 1731; the *Williamsburg (Va.) Gazette* in 1736. In his *History of Journalism* Hudson considers the subject by "eras." Within the first era, 1690-1704, the only noteworthy event, after the prompt suppression of the *Publick Occurrences*, happened in New York, where Benjamin Fletcher, then lieutenant-governor of the colony, having induced William Bradford, a printer of Philadelphia, to quit that city and set up in New York, caused the reprinting, in 1696, of a copy of the *London Gazette*, which contained an account of an engagement with the French not long before the peace of Ryswick. That was the only victory of types over official red tape in the 14 years following the suppression of the *Publick Occurrences*. However, news was circulated, much as it was in ancient Rome, in written and printed letters, circulars and handbills.

In the second "era," from 1704 to 1748, the American press made a decided start. On the 24th of April, 1704, John Campbell, of Boston, issued the first number of the *Boston News-Letter*. This is usually referred to as the first American newspaper, and indeed so it was, for it lived through many vicissitudes 72 years, up to the dawning of the revolution. In 1719 Campbell was superseded as postmaster by William Brooker, who followed Campbell's example by starting a paper, the *Boston Gazette*, the second American newspaper; and then began newspaper quarrels, a feature of journalism still far too prominent. Campbell resented his removal from office, and the fight was hot and personal. The day after the starting of the *Gazette* in Boston, Andrew Bradford issued in Philadelphia the *American Weekly Mercury*, Dec. 2, 1719. He also was a postmaster; so the post-office and the press appear to have been early united in this country, and the union has never been broken. In later years three notable editors, Benjamin Franklin, Amos Kendall, and John M. Niles became postmasters-general; and an ex-editor, James, postmaster of New York. Bradford died in 1742, and the paper was edited by his widow. On the 7th of Aug., 1721, the two Franklins—James and Benjamin—issued the first number of the *New England Courant*. Wars and contentions between journalists now increased, but the Franklins were too strong for their jealous opponents, one of whom, ex-postmaster Campbell, sold his *News-Letter* to Bartholomew Green, and became a justice of the peace.

American journalism was now fairly established. The *New York Gazette* was begun by William Bradford in Oct., 1725; the *New England Weekly Journal*, the fourth Boston newspaper, in 1727; the *Maryland Gazette* at Annapolis in 1727; Benjamin Franklin's *Universal Instructor in all the Arts and Sciences*, and *Pennsylvania Gazette* in Philadelphia in 1728; the *Weekly Rehearsal* in Boston in 1731, became the *Boston Evening Post* in 1735, and died of loyalty to the king in 1775; the *New York Weekly Journal*, Nov. 5, 1733, by John Peter Zenger, whose imprisonment for libel on the government,

prosecution, trial, and acquittal through the efforts of Andrew Hamilton, the leader of the Pennsylvania bar, marked the first great triumph of the freedom of speech and of the press that is now one of the great foundation stones of our temple of liberty. The *Weekly Post Boy*, another New York paper, was speedily absorbed by Bradford's *Gazette*, Sept. 27, 1732; the *Rhode Island Gazette* was begun at Newport by James Franklin, but it lived only three months, and Franklin himself died in 1735. About the same time the printing press, the invention that long afterwards gave the south so much annoyance, began to invade that section. The *South Carolina Gazette* was begun in Charleston, Jan. 8, 1731; the *Virginia Gazette* at Williamsburg in 1736. Both these papers died young on the death of their proprietors, and both were resuscitated soon afterwards. Returning north we find the *Boston Weekly Post Boy* begun in 1734, by the old postmaster, Ellis Huske, who recommended the passage of the stamp act. In 1742, William Bradford, grandson of the New York printer, started the *Pennsylvania Journal and Weekly Advertiser*, one of the earliest and most vigorous supporters of colonial freedom. On the day before the odious stamp act was to go into effect the *Journal* inclosed its pages in black lines, and placed over its title the picture of a skull and cross-bones, with the legend "Expiring; in hope of a resurrection to life again," with elsewhere, "Adieu, adieu, to the liberty of the press! Farewell liberty!" and as an epitaph, "The last remains of the *Pennsylvania Journal*, which departed this life the 31st of Oct., 1765, of a stamp in her vitals; aged 23 years." The paper, however, was not actually suspended. The *Maryland Gazette*, which had been suspended in 1736, was revived in 1745. A newspaper in the German language was issued at Germantown, Penn., in 1739, and another in Philadelphia in 1743. The last paper started in the colonial period was the *New York Evening Post*, begun in 1746, but it lived only about a year.

About the middle of the century the political heavens began to show signs of the coming revolution. Naturally, the cities where newspapers were issued became centers of political agitation. Though few in number, they were important in influence. In 1748 journals were issued in Boston, New York, Philadelphia, Annapolis, Williamsburg, and Charleston; only six places in all America that could boast of newspapers. In the same year Samuel Adams established in Boston the *Independent Advertiser*, an organ of the more ardent of those who were anxious to become "rebels." Then came the *New York Mercury*, begun by Hugh Gaine, Aug. 3, 1752. In 1753 the *Boston Gazette*, or *Weekly Advertiser*, appeared and lived until killed by the stamp act. The voices of freedom were growing in number and boldness; the Adamses, Otises, Warrens, Mayhews, Quincys, and others, filled newspapers and pamphlets with demands and arguments for freedom from England. The real organ of the New England patriots appeared April 7, 1755—the *Boston Gazette and Country Gentleman*. On the first day of the same year the *Connecticut Gazette* was begun at New Haven. The *Boston Gazette*, however, was the mouthpiece of the men who created the revolution; but it was not much of a "newspaper" in comparison with those of our day. It had two pages only, on half a sheet of crown paper—about the size of a single leaf from an ordinary ledger. While the British troops occupied Boston the *Gazette* was issued in Watertown, but returned to Boston after the troops left. The next new issue was the *North Carolina Gazette*, begun at Newbern, Dec., 1755. Then came the *New Hampshire Gazette*, Oct. 7, 1756—the oldest American living journal, having been published without intermission and without a radical change of name to the present time. Other papers appeared as follows: *Boston Weekly Advertiser*, Aug. 22, 1757; *South Carolina and American General Gazette*, 1758; *Newport (R. I.) Mercury*, June 12, 1758, still living; the *New London Summary*, Aug. 8, 1758; another *New York Gazette*, Feb. 16, 1759; the *Wilmington (Del.) Courant*, 1761; the *Providence (R. I.) Gazette and County Journal*, 1762; the *Georgia Gazette*, Savannah, April 17, 1763; and the *New London Gazette*, afterwards the *Connecticut Gazette*, Nov. 1, 1763. The *Connecticut Courant* was begun at Hartford Nov. 19, 1764, and still lives; the *Cape Fear Gazette* and *Wilmington Advertiser* was begun in 1763; the *Portsmouth (N. H.) Mercury and Weekly Advertiser*, 1765; the *Maryland Gazette*, 1765; the *Gazette and Country Journal* at Charleston, 1765; the *Constitutional Courant*, Burlington, N. J., 1765 (one issue only); the *Virginia Gazette*, 1766, the first newspaper to publish, ten years later, the full copy of the declaration of independence. At the commencement of the revolution there were seven newspapers published in New England, four in New York, and two in Virginia. One of the most important of the revolutionary newspapers was the *New York Journal, or General Advertiser*, started May 29, 1767, by John Holt, under the auspices of George Clinton and Philip Schuyler, two prominent patriot leaders. When the British took possession of New York, the *Journal* was removed to Kingston, and thence to Poughkeepsie. The British were not without a voice amid all this array of revolutionary prints. Their organ in New York was the *Royal Gazetteer*, better known as *Rivington's Gazette*, from the proprietor, James Rivington, who enjoyed the distinction of several mobbings by the "Sons of Liberty" and other mysterious organizations. In Boston the royalist paper was the *Chronicle*, the proprietors of which—Mein & Fleming—received similar treatment. This paper died in 1770 for want of patronage, but Rivington's paper lived until the war was over, then pretended to be converted, but was not trusted, and soon died. One of Rivington's best contributors was Major André. In 1767 appeared the *Pennsylvania Chronicle*; in 1768, at Salem, Mass., the *Essex*

Gazette, now the *Salem Gazette*; also the *New York Chronicle*, short lived; and Oct. 13, 1769, the *Cape Fear Mercury*, at Wilmington, N. C.

It is unnecessary to mention every newspaper of those times. A few were especially conspicuous, such as the *Massachusetts Spy*, established by Isaac Thomas. The 49 newspapers established in the colonies from 1748 to the peace of 1783 were weekly or semi-weekly issues. Between 1690 and 1783, 67 newspapers had been started, but 43 only were living when peace was concluded.

With peace and independence came an entire revolution in the spirit of the press. Journals which lately had fought side by side, soon ranged in opposing and hostile fleets, as the leaders and organs of contending parties, of which the chief were the federalist and the republican, the latter soon changing into the democratic party. We have only to say of this period—1783 to 1812—that in the early portion the virulence of partisanship, the shocking language used by the press in political warfare, would be scarcely believed if we had space to quote it. Even Washington, who came from Yorktown like a demigod, received more wicked and vile abuse than would now be given to an abandoned felon. This bitterness was conspicuous during and after his second term, extended through Adams's administration and Jefferson's two terms, and was mollified only for a time by the war with England. After that war the democratic press preached a crusade against "blue-light federalists," and bad language flowed anew until the re-election of Monroe without opposition brought in the "era of good feeling" and a general suspension of hostilities. Among the leading journals and journalists of this period were many of the papers above named that lived through the revolution; the *Journal and Argus*, in New York, by Thomas Greenleaf; the *American Citizen*, by James Cheetham; the *Evening Post*, now the *New York Evening Post*, by William Coleman; the *New York Packet*, by Samuel Loudon; the *Massachusetts Spy*, by Isaiah Thomas; the *Massachusetts Centinel*, afterwards the *Columbian Centinel*, by Benjamin Russell; the *Philadelphia Aurora*, by Benjamin Franklin Bache, etc. One of the severest word-battles was over the alien and sedition laws, in which the liberty of the press was, or seemed to be, seriously threatened.

The first daily newspaper in the United States was the *American Daily Advertiser*, issued in Philadelphia in 1784—now the *North American*. Next year came the *New York Daily Advertiser*, for some time edited by the poet Freneau. The *Independent Journal*, published in New York, was the paper through which Hamilton, Madison, and Jay gave the world the remarkable articles now collectively known as *The Federalist*. As our western country became settled, the press followed closely the pioneer, as in later days—during the building of the Pacific railroad—the peripatetic office of the *Frontier Index* kept just ahead of the rails and the locomotive. In 1786 the *Pittsburgh (Pa.) Gazette* was begun, and still lives; and so we might follow the press directly onward to the shores of the Pacific. The combinations of papers with each other have been infinite; but a single instance will illustrate—that of the *Philadelphia North American*, in which are united ten different journals, viz.: the *Pennsylvania Packet*, established in 1771; the *American Daily Advertiser*, 1784; the *Gazette of the United States*, 1789; the *Evening Advertiser*, 1793; the *United States Gazette*, 1804; the *True American*, 1820; the *Commercial Chronicle*, 1820; the *Union*, 1820; the *North American*, 1839; and the *Commercial Herald*, 1840. What mixtures of political principles must have been taken down in those nine swallows! Returning to daily newspapers, we remark that of many hundred daily and other newspapers started in New York city alone from the commencement of Bradford's *Gazette* in 1725 to the year 1827, only two are living—the *Commercial Advertiser* and the *Evening Post*. Death, it is said, loves a shining mark, and journalism appears to have given his arrows abundant opportunity. No other field of intellectual or pecuniary enterprise is at once so attractive and so dangerous. It would occupy nearly the whole of one of the eight-page journals of to-day to print merely the names of newspapers that have started since 1690 only to fade like rootless plants under a fervid sun.

Enough has been given to convey an idea of the early history of journalism in the colonies and the United States. But the history of "newspapers" as such does not commence until about 1820. Before and during the revolution the ambition of journalism was to crystallize public opinion. The news printed was chiefly from foreign countries. It is true, the first sheet was entitled *Publick Occurrences*, but its small installment of domestic news so filled with surprise the powers that were, that they immediately suppressed the daring innovation. Thenceforth the greater portion of journals was occupied with discussion, and news was hardly so much as a secondary consideration. Their columns were filled with dissertations on every possible subject save the things at the time most deserving of notice. The price of newspapers was high and their circulation limited. Indeed, it was not until the introduction of rotary presses that any considerable circulation could be "worked off." Ben. Franklin was content with the old Ramage press, a clumsy wooden construction that required a separate "pull" for every page, whose utmost capacity would scarcely produce a hundred perfected sheets in an hour. If his soul could look out through the dull eyes of his statue in Printing-house square, how it would glow with astonishment to see under the street beneath his feet 20,000 newspapers, each one as large as ten of his, printed, cut, and folded in that same space of an hour. Soon after 1830 there was started in New York a paper which was sold for one cent—a daring innovation indeed, when the common price was sixpence. It was spe-

cially devoted to local as well as general news, and speedily attained a circulation that, for the period, was phenomenal. This was *The Sun*, the pioneer of the penny press. In 1835 it was followed by *The Herald*, also a one-cent paper, which went on from prosperity to prosperity until it stands to-day among the few great newspapers in the world. *The Tribune*, also a one-cent paper at the time, was started in 1841 by Horace Greeley, and is now in many respects without a rival. The cognate ideas of home news and low prices revolutionized journalism. The mammoth sheets of the past were distanced and defeated, and by degrees the greater portion of them paid more attention to news and less to discussion, and in many instances greatly reduced their prices. We then had real newspapers, and the getting of the news became the publisher's first aim. Expresses were established on steamboats and railways, and where these were lacking, news came by "pony express," or any other available means. Carrier-pigeons were tried, but they did not succeed. Boats ventured far out to sea to intercept incoming ships; special correspondents were sent to various points, and in one instance a fast-sailing pilot-boat was sent across the Atlantic. Competition became so intense and the expense so great that neighboring journals combined to share the costs and the benefits. So arose the harbor-news association, and a little later the associated press. The latter association, which now spreads its news-gathering net over all the habitable earth, was a necessary result of the introduction of the magnetic telegraph. That invention annihilated space, and made competition by horses or steam impossible. At first we had fifty words or so "by telegraph" from Washington, at a round price. To-day we have column upon column every morning by the same wonderful conveyance from every state and territory of our country, from all the nations of Europe and Asia; literally "from Greenland's icy mountains to India's coral strand."

Having the news, the next question was how to circulate it. Here the inventive genius of America came to the publisher's relief, first in Hoe's steam rotary press, of from two to ten cylinders, which might throw off 10,000 papers in an hour. Then came the perfecting press, printing both sides at once from a continuous roll of white paper and cutting off each paper at the proper point. Still later came the most important of all: the stereotyping of the original type-pages and the production of one or a hundred casts, as might be desired, and that, too, in a space of time not exceeding 15 minutes for a page of stereotype. The problem of circulation was thus settled. It is now merely a question of how many presses are run; for with enough of them a daily newspaper could as well print on a morning before sunrise half a million as half a hundred thousand. The result of these and other inventions is, that where Franklin could produce in an hour 100 sheets of four small pages, to be afterwards slowly folded by hand, the modern press will produce 15,000 to 20,000 sheets of eight, twelve, or sixteen pages—each page as large as the whole of Franklin's paper, beautifully printed, the pages cut, sometimes the backs pasted together, and all folded and ready for mailing or delivery, in the equivalent 60 minutes. The capacity of newspaper production is practically unlimited. See PRINTING.

We lack space to follow the course of journalism closely through its hundred battles since the war of 1812. How the partisans raved over the first defeat of Gen. Jackson in 1824; the incipient rebellion in South Carolina; Jackson's war with the United States bank; the furious anti-masonic crusade; the tremendous financial disasters of 1837, which overthrew the democratic party; the gallant but futile struggles of Henry Clay; the war of tariff and free-trade, "still beginning, never ending;" the native American campaign; the annexation of Texas; the Mexican war; the contest of the north and south, that found an ending which was not an end in the compromise measures; the California annexation and the gold craze; the Kansas struggle; the death of the whig, the birth of the republican, and the division of the democratic party; the election of Lincoln; the dreadful struggle of the civil war; the triumph of the union; the dark days of commercial distress—all these are in the history of journalism, but so vividly remembered that further reference is quite unnecessary.

Of the men who have been conspicuous in connection with American journalism, we cannot pretend to give a catalogue. Before and during the revolution, and down to the second war with England, nearly all public men of importance spoke through the press. In the newspapers were heard James Otis, Samuel Adams, Joseph Warren, John Hancock, Jonathan Mayhew, and scores of their brethren. Jefferson, Madison, Burr, Hamilton, Clinton, Jay, and scores of other politicians were heard in the same manner. Benjamin Franklin, and Noah Webster, and Charles Carroll, of Carrollton, were early in the long line of "able editors." William Cobbett created a sensation in Philadelphia with his *Porcupine*; and James Cheetham, and William Duane, and William Coleman were eminent in this field. In the later time we find such names as Seba Smith, Jr., the original "Major Jack Downing;" Francis Hall, William L. Stone, John Inman and Robert C. Sands of the New York *Commercial Advertiser*; Mordecai M. Noah, Nathaniel Willis, grandfather of the poet; William D. Gallagher, William Schouler, Richard Haughton, Samuel Medary, Charles C. Hazewell, Samuel S. Cox, John B. McCullough, Joseph Medill, Horace White, Wilbur F. Storey, William Cullen Bryant, James Watson Webb, Horace Greeley, James Gordon Bennett, Henry J. Raymond, Manton Marble, James and Erastus Brooks, Charles King, William Leggett, John Bigelow, Thurlow Weed, Edwin Crosswell, Redwood Fisher, Joseph Gales, Hezekiah Niles, Francis P. Blair, Duff Green,

William W. Seaton, John Rives, Amos Kendall, Thomas Ritchie, George D. Prentice, George W. Kendall, Don Piatt, Frederick Douglass, Solomon Southwick, John H. Pleasants, Isaac Hill, William Cassidy, Henry Wheaton, Moses Y. Beach, Sidney E. Morse, Henry W. Bellows, Henry M. Field, Henry Ward Beecher, Gulian C. Verplanck, George P. Morris, Nathaniel P. Willis, Park Benjamin, Henry B. Anthony, Whitelaw Reid, William Sprague, George Wm. Curtis, Josiah G. Holland, William D. Howells, George H. Andrews, David Hale, Gerard Hallock, William C. Prime, David M. Stone, William W. Clapp, Joseph T. Buckingham, Theophilus Parsons, George Lunt, William Lloyd Garrison, John Neal, Samuel Bowles, John S. Sleeper, E. C. Bailey, R. Barnwell Rhett, Rufus Dawes, John Forsyth, George W. Childs, John W. Forney, William M. Swain, Russel Jarvis, Willis Hall, Charles A. Dana, Sidney Howard Gay, Oliver Johnson, John Russell Young, William G. Brownlow, Murat Halsted, Henry Watterson, Richard Smith, George Dawson, Thomas Kinsella, Jonas M. Bundy, Hugh Hastings, Charles E. Smith, George Jones, Joseph Pulitzer, Joseph R. Hawley, R. M. Pulsiter, and E. L. Godkin.

Of the influence of this aggregation of intellect upon the country we set forth no opinion. It is certain that the once almost despised journalist who took cord-wood and garden-truck in pay for his 7 by 9 sheet, has risen to the highest social and political position. While about the last class of citizens who are willing to do as they ask others to do—assume office and discharge its duties—not a few of them have been chosen to such duties by the people. No professional journalist has yet been president of the United States, but one has been vice-president; a few have been governors of states; a large number have been United States senators and members of congress; some of them have been ministers to foreign countries, and several have declined that honor. One has been a cabinet officer. In the 41st congress there were 8 editors in the senate and 26 in the house, the speaker being one of them. In the succeeding congresses the numbers have been about the same.

Prominent among the features of modern journalism, besides the dominant idea of the news and all the news, is the fullness of reports of matters of public importance. When the news of the great battle of Waterloo reached London, the *Times* told the story in less than half a column. Such an event to-day would occupy twenty or thirty columns. The resources of journalism were well exemplified in our rebellion, when "extras" were issued almost hourly on important occasions, and the press was constantly in motion. Modern reporting is nearly perfect; but that does not satisfy the newspapers, and it has been supplemented by a system of endless and minute inquiry known as "interviewing," whereby all men who are suspected of knowing anything of any particular matter are visited by reporters and questioned and cross-questioned until the last item of information has been extracted; and this not only in matters of fact but in matters of opinion. Journalism compels the world to stand and testify on every conceivable topic that may, in the journalist's opinion, interest the reader. Add to this searching inquiry the inevitable editorial comment, and it must appear that the research and the combinations of facts, opinions, and speculations thereon by modern journalism are as complete and as exhaustive, though not as guarded, as the most formal and satisfactory trial in a court of justice. This "interview" is a kind of moral rack on which any man may be stretched without a moment's warning. Whether its results are good or bad, we leave others to judge.

According to the census of 1890 there were of journalistic publications in the United States in foreign languages about 790 German; 130 Norwegian, Swedish, and Danish; 43 French; 33 Spanish; 25 Bohemian; 22 Polish; 18 Dutch; 14 Italian; 6 Hebrew; 4 Welsh; 4 Finnish; 3 Chinese; 2 Portuguese; 2 Hungarian; 2 Slavonic (unspecified); 2 Volapük; 1 Armenian; 1 Gaelic; 1 Indian; 1 Lithuanian, together with several published in more than one language, making in all 22 languages represented in the periodical publications of the United States. The total number of periodicals in foreign languages was 1159.

The burden of the press in such a land is naturally political; and a great majority of the newspapers are committed to one or another party; a few claim to be independent, but absolute independence of parties is a difficult position to maintain, and the only really independent journals, politically speaking, are those and those only which never meddle with politics, parties, or candidates at all. Next to political journals, in number and importance, are those devoted to religious or sectarian interests. Of these there were in the United States, in 1890, 1182 as compared with 553 in 1880, and many of them had a very extensive circulation. Every sect amounting to a "denomination" has its voice in journalism. The city of New York may serve as an example for the whole country. In 1896 there were issued in that city over 70 religious or sectarian journals and magazines, representing the following denominations: Union Evangelical, Roman Catholic, Methodist, Episcopal, Presbyterian, Congregational, Baptist, Jewish, Lutheran, Dutch Reformed, Swedenborgian, Christian Science, etc. There were also several "non-sectarian" religious periodicals, and one "free thought" publication. Religious journalism, now of great extent and importance, is of recent origin, dating back only to the beginning of 1816, when the *Boston Recorder* was started, with Sidney E. Morse as editor. The *Recorder* was long ago merged in *The Congregationalist*. *The Christian Watchman*, now *The Watchman*, also published in Boston, was started in 1819 by Baptists; the *New*

York Observer (Presbyterian) in 1820 by Morse, who had left the *Recorder*, and one of his brothers; *Zion's Herald* (Methodist) in Boston about the same time; the *Christian Register* (Unitarian), 1821; the *Christian Intelligencer* (Dutch Reformed), 1830; the *Evangelist* (Presbyterian) in 1833; the *Christian Advocate and Journal* (Methodist Episcopal), by the M. E. Book Concern in New York, about 1835.

Illustrated journals have in late years greatly improved, and in some notable instances, such as *Harper's Weekly*, have taken the front rank in editorial ability, perfection of artistic workmanship, and in extent of circulation. Others are the *Illustrated American*, *Frank Leslie's Illustrated Newspaper*, and among magazines the monthlies, such as the *Century*, *St. Nicholas*, *Harper's*, and *Scribner's*. Distinctive comic journalism has been slow to attain permanent success. A hundred *Punches* have been born, but very few lived to celebrate an anniversary of their natal day. At present, however, there are many instances of success in this line of journalism. Business and trade have a strong showing among journals, there being scarcely a calling of any importance that has not from one to a dozen typographic mouthpieces. There are hundreds of journals devoted exclusively to finance and commerce in general. Special branches have their organs; as banking, life, fire, marine, and accident insurance, real estate, mining, railways, milling, engineering, building, upholstery, lumbering, prices current, mechanics in general, glass, crockery, iron, leather, boots and shoes, tobacco, cotton, gas, wines and liquors, telegraphing, brewing, chemistry, microscopy, phonography, photography, bricks and pottery, carpet trade, drugs, harness, carriages, watches and clocks, car-building, plumbing, sewing-machines, publishing, printing, etc. Journals are devoted to legal affairs, to sports and games, to art and music, to the fashions, to the army and navy, militia, etc. In 1890 agriculture and horticulture engaged the attention of three hundred and twelve journals and magazines; medicine and surgery of one hundred and eighty-seven; affairs concerning colleges, schools, and education generally, of 396, a large proportion being intended for children and youth; masonic and other secret societies have their organs: indeed, it would be difficult to find any business, association, or prominent enterprise that has not its journalistic means of communication with the world. In all this maze of purposes one business is never overlooked, — that of criticism. Every interest, business, profession, party, sect, searchingly criticises every other purpose, act, person, and thing. Not only the regular literary and critical publications, but every news, political, and trade journal considers criticism among the first and most important of its functions. Unrestrained by any other will than his own, every writer is free to arraign, try, convict, and condemn everybody else, — and it must be admitted that the privilege is most liberally and liberally used. See JOURNALISM, COMIC, and JOURNALISM, ILLUSTRATED; and for later statistics the article NEWSPAPERS.

AMERICAN LITERATURE. The first books produced in the American colonies were written by Englishmen, some of whom made but a temporary sojourn in the country, and, while valuable and interesting contributions to history, are for the most part of little importance regarded as literature. The redoubtable Capt. John Smith, the hero of the Pocahontas legend, was one of the founders of Jamestown, Va., the earliest English settlement in America. His graphic account of the new colony, entitled *A True Relation of Virginia*, was published in London in 1608. The same year he forwarded a *Map of Virginia*, with an attractive description of the country, which was published at Oxford in 1612. These works and a vigorous letter in reply to the complaints of the London stockholders are all that were written by Capt. Smith on American soil. William Strachey's account of Sir Thomas Gates's expedition in 1609-10 is interesting on account of its literary merit, but especially so because the author's thrilling description of a storm which wrecked the Admiral's ship on one of the Bermuda Islands is supposed to have been the inspiration of Shakespeare's *Tempest*. The first purely literary work produced in the colonies was a translation of Ovid's *Metamorphoses*, by George Sandys, son of the distinguished Edwin Sandys, Abp. of York. His version of the first five books had been published in 1621, before he sailed for the New World, and he completed the other ten books in Virginia, under the most adverse circumstances, the colony, which had just begun to thrive, having been nearly depopulated by an Indian massacre in March, 1622, not long after his arrival. The entire work was published in London in 1626, and received with warm commendation. William Bradford, for many years governor of the Plymouth Colony, has been styled "the father of American history." His manuscript *Hist. of the Plymouth Plantation* was largely quoted by Nathaniel Morton and other early historians of Mass., but the original was supposed to have been destroyed during the occupation of Boston by the British in 1775-76. This earliest and most valuable record of the first N. E. Colony was discovered in 1855, in the Bp. of London's library at Fulham, and was copied and published by the Mass. Hist. Soc. nearly 200 years after the author's death. Gov. John Winthrop was the historian of the Mass. Bay Colony. His *Hist. of New England* is in the form of a diary from 1630-49, and is highly esteemed as an authentic record of the later but more important colony. Several of the incidents which he narrates have been made the themes of poems or romances by Longfellow, Hawthorne, Whittier, and Motley. The manuscript of Winthrop's *History* met with a fate similar to that of Bradford's. It was in three

parts, and two of them, then supposed to be the whole, were published by Noah Webster. A third part was discovered by Abiel Holmes in the tower of the Old South Church in Boston, and the entire work was first published in 1826. Edward Johnson's *Wonder-working Providence of Zion's Saviour in New England* is valuable as a thoroughly characteristic expression of Puritan life and thought. William Wood's *New England's Prospect* is a vivid and well-written description of the country and its aboriginal inhabitants. Portions of the work are metrical, as the enumeration of the forest trees, and here it has been noticed that the choice of adjectives is singularly appropriate. John Josselyn's accounts of the fauna and flora of the New World in his *New England Rarities* and *Two Voyages to New England* are a curious mixture of fact and fable.

On the 28th of Oct., 1636, not quite sixteen years after the landing of the first pilgrims at Plymouth, the general court at Boston voted £400 toward a school or college, thus laying the foundation of the literature of the new world. Two years later John Harvard, an English clergyman of superior education, who had been scarcely a year in the colony, gave twice as much money and a library of 320 volumes—a large collection for those times—in aid of the "school or college." Thus began Harvard College, at Cambridge, Mass. Around this venerable institution and its co-laborers, William and Mary (1693), Yale (1700), the College of New Jersey (1746), and Kings (now Columbia) College (1754), cluster the names of the creators of American literature.

Many pious and able Puritan divines, driven to America through the intolerance of Abp. Laud, became leaders in religious and educational movements, and their sermons and other writings constitute the chief part of the early colonial literature. The most eminent of these divines were Thomas Hooker, John Cotton, Thomas Shepard, Francis Higginson, Urian Oakes, Roger Williams, the ardent champion of toleration, founder of Rhode Island and Providence Plantations, John Eliot, the "Apostle to the Indians," who translated the Bible and other works into the Algonkin language, and Richard Mather. The last two, together with Thomas Welde, were the authors of the famous *Bay Psalm Book*, published at Cambridge, Mass., in 1640, the first English book printed in America. To their zeal for a literal rendering of the Hebrew text every other consideration was sacrificed, and this version is distinguished as being "the worst of many bad." In fact, most of the colonial verse which has come down to us is mere doggerel. Mrs. Anne Bradstreet, daughter of one Massachusetts governor and wife of another, and ancestress of the Channings, the Danas, Wendell Phillips, and Oliver Wendell Holmes, was a much-admired poetess, but her productions are for the most part stilted, and full of such quaint and artificial conceits as were affected by her favorite Sylvester, and other contemporary English poets. Capt. John Mason's brief *Hist. of the Pequot War* is a clear and vigorous narrative of the expedition which resulted in the extermination of that hostile tribe. Daniel Gookin's two historical accounts of the Indians of New England are the records of a philanthropist who was an associate of the apostolic Eliot. Nathaniel Ward, a scholarly non-conformist clergyman, first settled at Agawam (now Ipswich), Mass., was the author of *The Simple Cobbler of Agawam*, a caustic and witty satire on social, political, and ecclesiastical affairs in England, with occasional hits at the colonies. Peter Folger, maternal grandfather of Benjamin Franklin, wrote in clumsy rhyme *A Looking-Glass for the Times*, and Michael Wigglesworth, an early graduate of Harvard, wrote *The Day of Doom*, a rude but powerful poem descriptive of the last judgment. But the first native author of any considerable fame was the vigorous and prolific Increase Mather, who was also the first native president of Harvard College. He was the son of the sturdy non-conformist divine Richard Mather, already mentioned. His published works number 92, most of them sermons. His best-known production is *An Essay for the Recording of Illustrious Providences*. Both father and son were, however, eclipsed by the more prolific and more famous son of Increase, Cotton Mather, grandson also of the celebrated John Cotton, for whom he was named. Cotton Mather was a theologian of the strictest Puritan type; an uncompromising defender of the faith; a steadfast believer in the reality of witchcraft, and an opposer of it as a work of Satan. He used his pen not only for religion and against Satan and the witches, but in advocacy of temperance and in behalf of seamen. He wrote extensively also on historical subjects. In fecundity he rivaled the most famous authors of England. An incomplete catalogue of his works numbers 383 separate publications, and there yet remain six great folio volumes of closely written manuscript. His most celebrated work, the *Magnalia Christi Americana*, is not merely an ecclesiastical history of New England from 1620 to 1698, but it is also a vast treasury of varied information concerning the secular affairs of the N. E. colonies, and, like Gov. Winthrop's *Diary*, it has furnished themes for modern poets and romancers. Chief Justice Samuel Sewall, of honored memory, has been called the "Puritan Pepys," because of the frank garrulousness of his *Diary* (from 1673-1729). His *Phænomena Quædam Apocalyptica* is referred to in Whittier's poem, *The Prophecy of Samuel Sewall*. *The Selling of Joseph* is his brief but powerful argument against slavery, which then existed in New England. About 1691 (the precise date of the first edition is not certain) appeared the celebrated *New England Primer*. John Winthrop, Gov. of Ct., son of Gov. Winthrop of Mass., during a visit to the mother country became one of the founders of the celebrated *Royal Soc.* of England (incorp. 1663), and was its chief correspondent from America. The establishment of this society greatly stimulated the study of the sciences and of natural history in all the colonies.

• Entering the 18th c., we meet a name that towers high above all preceding, and in

metaphysics and theology above nearly all following American names, Jonathan Edwards (1703-1758), the last and greatest of the Puritan apostles, the Boanerges of Calvinism, whose influence still permeates New England, where the greater part of his life was spent, and whose memory is treasured in the College of New Jersey, over which he presided for the last few months of his life. His influence was not confined to this country, however, but was long potent in English theology. Robert Hall says of Edwards, "He ranks with the highest luminaries of the Christian Church, not excluding any country nor any age since the Apostolic." His style, though not always lucid, is vigorous. His intense conviction of the truth of the doctrines that he preached, and the purity and spiritual elevation of his character, gave to his eloquence remarkable fervor and impressiveness. His writings fill ten large volumes, the most famous of them being the *Inquiry into the Freedom of the Human Will*, and the *Treatise on the Religious Affections*. With Edwards the domination of theology, which had continued from the landing of the Pilgrims, passed away, and philosophy and belles-lettres began to have audience.

Another great American, Benjamin Franklin, gained an enduring fame abroad as well as at home for his achievements in science and diplomacy, and for his wise and prudent counsels in the affairs of every-day life. Every child knows or should know the story of the poor apprentice, who "tore the lightning from heaven and the sceptre from tyrants," and left to American literature the wisdom of an honest and a great mind. The most valuable and interesting of his works are his *Autobiography*, written in an easy and natural style, his letters and papers on electricity, and the pithy sayings of *Poor Richard's Almanac*. The revolution almost suspended literary activity, except in the political sphere, and the names following Franklin's belong to the forum as well as to the printed page. Samuel Adams, James Otis, and Josiah Quincy, Jr., all of Mass., and Patrick Henry, of Virginia, by burning words of patriotism, both spoken and written, did most effective service in encouraging the hearts of their countrymen in the struggle for freedom. Thos. Jefferson's vigorous pen drew up the *Declaration of Independence*; the brilliant Alex. Hamilton, Washington's mentor and chief reliance, the Ajax of federalism, wrote with great ability on finance and on political economy, but his most important essays are on the Constitution of the United States, and especially the fifty-one papers which he contributed to the *Federalist*. Jas. Madison wrote twenty-nine valuable papers for the same publication, and John Jay contributed the remaining five. The latter also wrote in 1774 an eloquent *Address to the People of Great Britain*. George Washington's diaries, letters, and state papers are dignified and perspicuous. His celebrated *Farewell Address* bears the impress of his own style, although Hamilton and Jay assisted in its preparation. John Adams, the second President of the United States, was an influential political writer, and his diaries and letters contain many interesting accounts of memorable events of his time. Others who contributed by voice and pen to the establishment of the republic are Fisher Ames, Thomas Paine, and Albert Gallatin; the latter is deservedly famous in diplomacy and as a writer on finance. The efforts of the revolutionary orators were effectively aided by the humorists, Francis Hopkinson, H. H. Brackenridge, and Philip Freneau, whose satires and patriotic ballads exerted a potent force. Joseph Hopkinson, a son of the former, is the author of *Hail Columbia!* (1798.) Freneau had a genuine poetic gift, and is the first American poet of real fame. Scott and Campbell have each borrowed a line from him. *The Wild Honey-suckle* and a few other of his lyrics have a natural grace, and Richardson praises his *House of Night* as "the best poem written in America before 1800;" but the mass of his writings is of small value. An interesting phenomenon in authorship was Phillis Wheatley [Peters], a full-blooded African, brought to Boston when a child and bought in the slave market there by a Mrs. Wheatley, whose name she took. She possessed unusual mental gifts, and was a poet of no mean order. Her poems, published in 1773, remain "the principal achievement [in literature] of the colored race in America." Wm. Livingston, governor of New Jersey in 1776, was the author of *Philosophic Solitude*, a heavy didactic poem. Timothy Dwight, Pres. of Yale Coll., wrote the *Conquest of Canaan*, the first epic produced in America, *Greenfield Hill*, and other poems. The familiar hymn, *I love thy kingdom, Lord*, is his paraphrase of a part of the 137th Psalm. His most important work was *Theology Explained and Defended*, in 5 vols. John Trumbull satirized the Tories in *McFingal*, the best imitation of Hudibras ever produced. His *Progress of Dulness* is a satire on the prevailing modes of education. Joel Barlow's ambitious epic, *The Columbiad*, proved a decided failure, but his mock-heroic poem, *The Hasty Pudding*, attained great popularity. Thomas Godfrey's *Prince of Parthia* (1758) was the earliest attempt at dramatic writing, but *The Contrast* (1786), by Royall Tyler, afterward Chief Justice of Vermont, in which the original "stage Yankee" appears, was the first American play produced in public by professional actors. William Dunlap, by numerous plays, original and adapted, did much to further the development of the American drama. Mrs. Mercy Otis Warren, sister of James Otis, wrote *The Adulator*, a political satire, *The Sack of Rome*, and *The Ladies of Castile*, works highly commended by John Adams. Charles Brockden Brown, a Philadelphian, whose Quaker ancestors came over with William Penn, is the first American novelist, and the first author who made literature a profession. His *Wieland; or, The Transformation* (1798), *Ormond; or, the Secret Witness* (1799), and *Arthur Mervyn* (1800) are works of acknowledged merit, and the description in the latter of the yellow fever in Philadelphia is said

to compare in vividness with Defoe's description of the great plague in London. Brown is highly eulogized by Prescott, and was a favorite author with Shelley. Susannah Haswell Rowson wrote various stories, an opera, farces, poems, and school-books. Her most noted work, *Charlotte Temple*, a sentimental tale, published in 1790, was very popular in the early part of the 19th century. To counteract its tendency, perhaps, Tabitha Gilman Tenney wrote in 1808 *Female Quixotism*, a satire on the extravagant sentimentalism of the time. In the department of history we have Robert Beverley's *Hist. of the Present State of Virginia*, published in 1705, in order to correct certain misrepresentations concerning the colony. He gives an interesting account of plantation life and its generous hospitality, of the fauna and flora of the region, and of the Indians. Another interesting picture of this locality is found in Col. Wm. Byrd's *Hist. of the Dividing Line*, one of the Westover mss., a fresh and pleasing narrative of travel and adventure in Virginia and North Carolina, in connection with a survey made in 1728 of the boundary between the two states. It was not published till 1841. Other mss. of this collection still unpublished are in the possession of Congress. In 1716 Thomas Church edited the *Hist. of King Philip's War*, written by his father, Capt. B. Church, who took a leading part in the struggle. In 1727, Cadwallader Colden, a Scotch resident of the New York Colony, published an excellent *Hist. of the Five Indian Nations*. Thomas Prince's *Chronological Hist. of New Eng.* (published 1736 and 1755), though a fragment extending only to the year 1633, is highly prized because of its accuracy. His large and unique collection of early American books and mss. is now a valued possession of the Boston Public Library. *The Hist. of Virginia* from its first discovery and settlement to the year 1624, by Wm. Stith, third president of William and Mary College, is an impartial and valuable work. This history (pub. 1747) and the annals of Thomas Prince, above mentioned, are noteworthy as the first attempts of American authors to write history after the modern method—that is, with careful research and verification of facts. The tory Gov. Hutchinson is the author of a well-written *Hist. of the Colony of Mass. Bay from 1628–1774*, and Rev. Samuel Peters ("Parson Peters"), also a royalist, wrote a caustic *Hist. of Conn.*, full of wit and malice, and by no means restricted to facts. Jeremy Belknap published a *Hist. of New Hampshire*, and Ezra Stiles, Pres. of Yale Coll., a *Hist. of Three of the Regicide Judges*—Whalley, Goffe, and Dixwell. David Ramsay, who had the advantage of a personal acquaintance with the American leaders in the war, wrote a *Hist. of the Revolution in South Carolina*, a *Hist. of the Amer. Rev.*, and a *Life of Washington*, all works of value. Hannah Adams was the first American woman to devote herself wholly to literature. She wrote a *Hist. of New Eng.* and a *Hist. of the Jews*, but her chief work was a *View of Religious Opinions*, a description of the various beliefs of the world. During the latter half of the century, John Woolman, the Quaker, was writing the *Diary*, which Whittier afterwards edited. Lindley Murray, whose grammar was the *bête noir* of our grandfathers and grandmothers, and Noah Webster, the lexicographer, were eminently useful in promoting American literature indirectly, if not directly. Jedediah Morse gave the country its first geographical works soon after the establishment of the government. In addition to Franklin, who has been mentioned, the scientific writers of this century are Nathaniel Ames, whose *Astronomical Diary and Almanac*, begun in 1725, was issued yearly till 1775; Prof. John Winthrop, of Harvard Coll., who discoursed on earthquakes, storms, comets, and on various other astronomical topics; John Bartram, "the father of Amer. botany," founder of the once famous *Bartram's Garden* on the Schuylkill River, and his son, William, author of an interesting volume of studies in natural history, made during a tour of the southern colonies; Dr. Benj. Rush, writer on medicine and hygiene, and on miscellaneous themes; Wm. C. Redfield, meteorologist, who first remarked the rotary and progressive character of ocean storms; Benj. Thompson, of Mass., better known as Count Rumford, who wrote of experiments in physics and of political economy; Dr. Samuel L. Mitchell, Prof. of Chem., Nat. Hist., and Philos., in Columbia Coll., a savant of rare intellectual ability; and David Rittenhouse, astronomer and mathematician, of whom a high authority said, "We should place him in point of scientific merit second to Franklin alone."

Thus far, in our rapid survey, we have found comparatively few attempts to cultivate literature for its own sake, most of the works having been written for ulterior purposes, and with little attention to artistic style and finish. But the dawn was gradually growing brighter, and the true day of American literature was at hand, and with the opening of the 19th century, it was ushered in by Washington Irving, the first American man of letters to gain no less distinction abroad than at home. Born in 1783, Irving's style was to some extent influenced by the English literature of the 18th century. His gentle satires on society and discourses upon topics of the time, contributed to the *New York Morning Chronicle* and to *Salmagundi*, have the Addisonian flavor. But he soon developed an independent style. In *Diedrich Knickerbocker's Hist. of New York*, Irving was the first to employ that kind of humorous exaggeration which has been so much abused by later American writers. In his delightful *Sketch Book* he portrays characteristic scenes, whether American or English, with equal appreciation and with the same felicitous charm. Here appear some of the most famous creations of his genius—Rip Van Winkle, Ichabod Crane, and Katrina Van Tassel. A three years' sojourn in Spain afforded materials for an interesting *Life of Columbus* and for other charming books. Among his later publications are a brief but admirable *Life of*

Goldsmith, and the *Life of Washington*, in 5 vols. For this great work Irving had made a long and careful study of original authorities, and his picture of the illustrious leader is sympathetic, but without undue partiality.

Another brilliant name in our literary annals is that of James Fenimore Cooper, the most popular and one of the most prolific of American writers of fiction. His familiarity with frontier life in his youth and his six years in the U. S. Navy supplied him with an abundance of fresh and original material for his tales of the forest and of the sea. His fertility of invention is remarkable, and his narratives of adventure are vigorous and thrilling, but he is inferior in artistic skill to the best of our later novelists. The works on which his reputation chiefly rests are *The Spy*, the five Leather-Stocking Tales, *The Pilot*, and the *Red Rover*. "He wrote," says Bryant, "for mankind at large. . . . Hence it is that he has earned a fame wider . . . than any author of modern times. . . . The creations of his genius . . . shall live through centuries to come, and only perish with our language." Other writers of romance and fiction belonging to the first half of the 19th c. are William Wirt, of Maryland, Attorney-general of the U. S., author of *Letters of a British Spy*, and also of an admirable *Life of Patrick Henry*; Jas. K. Paulding, Irving's co-laborer on the *Salmagundi Papers*, whose best novel is the *Dutchman's Fireside*; William Ware, author of several fine historical romances, of which *Zenobia* is the chief; John P. Kennedy, author of *Swallow Barn*, a pleasing tale of the Old Dominion, and of two historical novels, *Horse-Shoe Robinson* and *Rob of the Bowl*; R. M. Bird, whose romances of Mexico, *Calavar* and *The Infidel*, were highly praised by Prescott for the accuracy of their local coloring; W. G. Simms, whose versatile pen discussed a great variety of topics, but who is remembered chiefly for his many novels, *The Partisan*, *The Yemassee*, etc., strongly sectional in feeling, but, as pictures of Southern life, lacking in vividness and careful detail; Washington Allston, the celebrated painter, who, besides lectures on art and graceful poems, wrote also the romance of *Monaldi*; and Sylvester Judd, author of that singular New England romance, *Margaret*, "the first Yankee book with the soul of Down East in't." John Sanderson's *American in Paris* was thought worthy of translation by no less a writer than Jules Janin. Gulian C. Verplanck appeared anonymously as a political satirist in 1819, and was afterwards the author of many discourses on art and literature. R. H. Dana, Jr., published in 1840 his *Two Years before the Mast*, a record of personal experience which is still read with interest. N. P. Willis, editor of the *Evening Mirror*, and later of the *Home Journal*, was one of the most popular literary men of the time. Other favorite authors were George P. Morris, Theo. S. Fay, Robert C. Sands, Joseph C. Neal, Charles Fenno Hoffman, Willis Gaylord Clark, Frederick S. Cozzens, and G. D. Prentice.

Among the women who wrote fiction during the first half of the century, the name of Catharine M. Sedgwick stands deservedly high. Her *Redwood* was translated into French and Italian. *Hope Leslie*, published three years later, was the most popular of Miss Sedgwick's tales. Mrs. Lydia Maria Child's *Hobomok*, a tale of Puritan times (1824), and *Philothea*, a romance of the days of Pericles (1836), merit honorable mention. Mrs. Child wrote much on domestic and social topics also, and was an ardent champion of the anti-slavery cause. Other authors of fiction are Miss Eliza Leslie, the first American woman to write stories for the young, Mrs. Hannah F. Lee, Miss Maria J. McIntosh, Mrs. C. M. Kirkland, and Mrs. Ann S. Stephens.

Edgar Allan Poe, a most original genius, is equally distinguished in prose and in verse. The mysterious and the terrible predominate in his writings. Death has a strange fascination for him, and he is ever striving to penetrate its secret. His prose is clear and forcible, and his verse is exceedingly musical, the melody being due in part to the skillful use of repeated phrases. All his works are finished with careful elaboration. The most powerful of the tales are *Ligeia* and *The Fall of the House of Usher*. Two of the poems, *The Raven* and *The Bells* (the latter a remarkable example of onomatopoeia), are familiar to all, being among the most effective pieces in the repertoire of the elocutionist. *Annabel Lee*, and the verses addressed *To Helen* and *To One in Paradise*, are natural and beautiful effusions, which awaken a sympathetic response; but most of the poems are of a weird and unearthly character. As a critic Poe was independent and fearless, but his judgment was not always correct, and he was sometimes unconsciously biased by personal likes or dislikes.

Other poets who flourished during the first half of the century and who require brief mention are Thomas Green Fessenden (Christopher Caustic), author of *The Country Lovers*, a humorous story in verse; of *Terrible Tractoration*, an amusing satire on the newly vaunted remedy, metallic tractors, and of various political satires; *Richard H. Dana*, whose principal poem, *The Buccaneer*, was highly praised by Prof. Wilson in *Blackwood*, and whose tales and essays in *The Idle Man* were greatly admired by Bryant; John Pierpont; James A. Hillhouse; Charles Sprague; Carlos Wilcox; James G. Percival; John G. C. Brainard; Joseph Rodman Drake, author of the charming *Culprit Fay*, and of the fine patriotic lyric, *The American Flag*, a poet of great promise, who died at the early age of 25 yrs.; Fitz-Greene Halleck, whose beautiful tribute to his friend Drake, beginning "Green be the turf above thee," and whose stirring poem, *Marco Bozzaris*, are familiar to all; and the young Southerner, Edward Coate Pinkney, who died in his 27th year, leaving a small volume of spirited and graceful lyrics. John Neal, poet and critic, was the first writer on American literature for for-

eign readers (in a series of articles in *Blackwood*). Francis Scott Key's *Star Spangled Banner* (1812), Samuel Woodworth's *Old Oaken Bucket*, John Howard Payne's *Home, Sweet Home*, Richard Henry Wilde's *My Life is Like the Summer Rose*, Albert Gorton Greene's *Old Grimes*, and Clement C. Moore's *A Visit from St. Nicholas*, are examples of single poems or songs to which the reputations of their authors are wholly or mainly due. The best known of John Quincy Adams's poems is a capital humorous effusion, *The Wants of Man*, based upon two familiar lines from Goldsmith's *Hermit*. Among the dramatists are Robert T. Conrad, John A. Stone (author of *Metamora*), and John Howard Payne. Mrs. Lydia Huntley Sigourney, b. 1791, was for many years the foremost author of her sex in the country, and the first American woman to become well known abroad by her works. A brief poem on the *Death of an Infant* is almost the only one of her productions that is now familiar. Mrs. Maria Gowen Brooks (Maria del Occidente, as Southey named her), b. 1795, is the author of *Zephirel; or, the Bride of Seven*, a narrative poem in seven cantos, founded on a story from the Apocrypha; of *Idomen*, or the *Vale of Yumuri*, in which she tells the story of her singularly romantic life, and of other poems of merit. Mrs. Sarah J. Hale, editor of *Godey's Lady's Book*, wrote *Sketches of American Character*, *Sketches of Distinguished Women*, many tales and poems, and compiled a *Dictionary of Poetical Quotations*. Other poets and sketch-writers prominent during the first half of the century are Mrs. Caroline H. Gilman, Mrs. Emma C. Embury, Mrs. Frances Sargent Osgood, Mrs. Sarah Helen Whitman, Mrs. Caroline Lee Hentz, and Mrs. Elizabeth Oakes Smith. The sisters, Lucretia Maria and Margaret Miller Davidson, were remarkable instances of precocity in verse and prose. Margaret Fuller (Marchioness Ossoli), whose melancholy fate by shipwreck is not forgotten, was one of the most terse and vigorous of American writers, a thorough scholar, and a critic of rare ability in art, literature, and social science. *Woman in the Nineteenth Century*, her principal work, is made up from papers contributed to the *Dial*, the organ of the Transcendentalists.

In the department of history and biography we have Chief-Justice Marshall's *Life of Washington*, surpassed by later biographies of our first President, but valuable as a history of his time; Abiel Holmes's *American Annals* (1492-1805), an accurate and useful chronological record; Henry Lee's *Memoirs of the War in the Southern Dept. of the U. S.*, and a *History of the War of 1812*, by Henry M. Brackenridge. But to Jared Sparks belongs of right the title of "Father of American History," because of his exhaustive search of national and state, as well as of English and French archives, for documents bearing upon the subject. His principal works are *Life and Writings of George Washington*, 12 vols.; *Diplomatic Correspondence of the Revolution*, 12 vols., and *Life and Writings of Franklin*, 10 vols. He also edited a *Library of American Biography*, 25 vols., himself writing eight of the memoirs. Chancellor Kent's *Commentaries upon Amer. Law* surpass Blackstone's *Commentaries* both in accuracy and in literary style. This great work and Judge Story's valuable *Commentaries on the Constitution of the U. S.* have caused American jurists to be honored throughout the civilized world. The political literature of the period is resplendent with many illustrious names. Foremost among these is Daniel Webster, whose eloquence has never been excelled by any speaker of the English tongue. His oratory was massive and imposing in effect. Its thrilling power is largely retained by the printed page. The chief element of Clay's eloquence was persuasiveness, and, unlike that of Webster, it depended in a considerable measure upon the magnetic personal influence of the man. John C. Calhoun's oratory was clear and vigorous, but without much rhetorical adornment. The preponderating influence of his powerful intellect was felt throughout the South for many years. Thomas Hart Benton was from 1820 to 1850 a distinguished member of the U. S. Senate. His *Thirty Years' View*, a history of the government during that time, is admirable, both for literary merit and for the just and courteous spirit it exhibits. The published works of John Quincy Adams, the sixth President of the U. S., and afterwards "the old man eloquent" of the House of Representatives, are on various themes, among them being a series of *Lectures on Rhetoric and Oratory*, written while he was a Professor of Rhetoric at Harvard College (1806-1809). Rufus Choate was for one term a member of the U. S. Senate, but his chief triumphs were in his chosen profession of the law. He was Webster's peer at the Massachusetts bar. His published works consist of *Lectures, Addresses, and Speeches*. Charles Sumner's great powers of oratory were largely employed in the anti-slavery cause, as were those of Wendell Phillips. Edward Everett was a graceful and polished speaker, whose eloquence was much sought on commemorative occasions. His published works include, besides his orations, a *Life of Washington*, a *Life of Stark*, and various historical papers. Henry Wheaton's *Elements of International Law*, published after the author's death under the able supervision of Wm. Beach Lawrence, is a standard work. The earliest scientific publication of note in the 19th c. is Alex. Wilson's *American Ornithology* (1808-1814), in 9 vols., 4to, with plates engraved and colored from original drawings. The author, a Scotch weaver and poet, was an enthusiast in natural history, and his descriptions are very beautiful and poetic. Wilson died in 1813, and the text of the last vol. was written by his friend, Geo. Ord. John James Audubon's great work, *The Birds of America* (1830-1838), is not inferior to Wilson's in the charm of the descriptions, and the illustrations are finer. The text fills five octavo vols., and the beautifully colored engravings five folio vols. Audubon, with his sons, published also *The Quadrupeds of America*,

with 150 plates. Benj. Silliman, Denison Olmsted, Edw. Hitchcock, Joseph Henry, Alex. Dallas Bache, and Gen. O. M. Mitchel are prominent names in science. Drs. Robley Dunglison and Jas. Rush are eminent writers on medicine and physiology. Timothy Flint, John C. Fremont, John L. Stephens, Lieut. Wm. F. Lynch, Rear Adm. Wilkes, Elisha Kent Kane, and others, have written valuable and interesting accounts of travel and scientific exploration. Henry Rowe Schoolcraft and Geo. Catlin studied the manners and customs of the N. A. Indians. The great work of Schoolcraft, published by Congress, is a vast treasury of information, but is, unfortunately, very ill arranged. Jos. E. Worcester and Chauncey A. Goodrich are prominent lexicographers. Gould Brown's *Grammar of Grammars* is a standard work. Lowell Mason's *Juvenile Lyre* (1830) is said to have been "the first book of school songs published in this country." Horace Mann wrote wisely and eloquently on popular education. Among the prominent clergymen and theologians were Nathaniel Emmons, Samuel Hopkins, Arch. Alexander and his sons, James W. and Joseph Addison Alexander, Robt. J. Breckenridge, Lyman Beecher, Samuel H. Cox, Leonard Woods, Moses Stuart, the father of American Biblical criticism; Nath. W. Taylor and Bennett Tyler, whose systems of theology were widely discussed under the names of *Taylorism* and *Tylerism*; Edward Robinson and Eli Smith, whose joint researches in the Holy Land led to the identification of many ancient sites; Sam. H. Turner, whose various commentaries are among the best contributions of the Epis. Ch. to the exposition of the Scriptures; Francis Wayland, author of valuable text-books on *Moral Science*, *Intellectual Philos.*, and *Political Economy*, and of an important treatise on *Human Responsibility*; Geo. Bush, the learned Orientalist; Geo. B. Cheever, a well-known advocate of temperance and other reforms; Wm. Ellery Channing, of whom it was said in *Fraser's Mag.*, "Channing is unquestionably the first writer of the age;" Wm. H. Furness, Thec. Parker, Hosea Ballou, Alex. Campbell, and Wm. B. Sprague, compiler of the *Annals of the American Pulpit*. Nor ought we to forget Jacob Abbott and S. G. Goodrich (Peter Parley), who were among the first to write books for the young, and the former of whom, especially, produced an astonishing number of entertaining and instructive works.

And now at the middle of the 19th c. we have reached the most illustrious period of American literature. W. C. Bryant, the Nestor of our most brilliant group of poets, the "father of American song," is distinguished for a noble and lofty imagination, clearness of thought, and purity of diction. He delights in picturing the sublimer aspects of nature. Among his masterpieces are *Thanatopsis*, the marvellous poem of his youth; *A Forest Hymn*, *The Antiquity of Freedom*, *To a Waterfowl*, *A Day Dream*, *Life*, and *The Evening Wind*. The charming little *Robert of Lincoln* is one of his few poems in lighter vein. The translations of the *Iliad* and *Odyssey* of Homer, made in Bryant's old age, are worthy of his prime. He was also a writer of pure and vigorous prose, and his career in journalism was long and honored. Whittier, the well-beloved Quaker poet of New England, with great self-abnegation, devoted his pen in youth to the anti-slavery cause, and thus the chief aim of his early poetry was moral rather than artistic. During the war his stirring patriotic lyrics exercised a powerful influence on public opinion. In later life, after emancipation was proclaimed, he was free to pay more exclusive attention to poetry as an art. His verse is marked by spontaneity, simplicity, fidelity to nature, religious earnestness, and a passionate hatred of tyranny and oppression. The beautiful idyl *Snow-Bound* is a charming picture of rural New England life in winter. *Questions of Life* is powerful and impressive. *Maud Muller*, *Barbara Frietchie*, *The Barefoot Boy*, and *Skipper Ireson's Ride* are well-known favorites. *The Tent on the Beach* is a series of tales in verse strung together after the manner of Chaucer. The chief prose works are *Margaret Smith's Journal*, an attractive picture of colonial life, and *The Supernaturalism of New England*, a collection of ghost and witch stories. By natural poetic endowment, and by thorough acquaintance with the languages and literatures of modern Europe, Henry W. Longfellow was admirably equipped for his life-work as a disseminator of culture among the people. His career of authorship lasted more than fifty years, during which time he produced many of the choicest gems of our literature. The characteristics of his poetry are refinement, tenderness, simplicity, and exquisite taste. Its chief defect is the absence of strong emotion. His fine poem, *The Building of the Ship*, however, closes with a grand apostrophe to the Union, which is full of patriotic ardor. Many of Longfellow's poems, and some of the most successful, as the lovely *Evangeline* and the *Courtship of Miles Standish*, are founded on incidents in early American history. *The Song of Hiawatha* has for its theme an Indian myth. Its peculiar rhythm is borrowed from the Finnish *Kalevala*. The charming romance, *The Golden Legend*, presents a vivid picture of monastic and secular life in mediæval times. *The Spanish Student* is the best of Longfellow's dramas. A few of the gems among his shorter poems are the two powerful ballads, *The Skeleton in Armor* and *The Wreck of the Hesperus*, *The Fire of Driftwood*, *The Occultation of Orion*, *The Day is Done*, and *The Children's Hour*. As a translator Longfellow reproduced with wonderful skill many poems from the Spanish, French, German, Danish, and Swedish, but his masterpiece is the admirable translation of Dante's *Divina Commedia*, which work is accompanied with some exquisite sonnets of his own. Longfellow's prose works are *Outre-Mer* and *Hyperion*, poetical sketches of travel abroad, and *Kavanagh*, a tale of New England life. The German idealistic philosophy of Kant and Fichte found congenial soil in New England, and there produced the new and modified

outgrowth of Transcendentalism. "The literature of Transcendentalism," says Beers, "was . . . a genuine New England literature and true to the spirit of its section. The tough Puritan stock had at last put forth a blossom which compared with the warm, robust growths of English soil even as the delicate wind flower of the northern spring compares with the cowslips and daisies of old England." To the Transcendental School of writers, of which Emerson was the leading spirit, belong Amos Bronson Alcott, H. D. Thoreau, Theodore Parker, Margaret Fuller Ossoli, who has already been mentioned, Jones Very, C. P. Cranch, Wm. Ellery Channing, Jr., D. A. Wasson, and many others. In fact, Lowell, Holmes, Whittier, G. W. Curtis, T. W. Higginson, and all the younger writers of the time were more or less influenced by it. We have not space to discuss the various phases of Transcendentalism, but would refer the reader to O. B. Frothingham's *Transcendentalism in New England*, to Lowell's sketch of Thoreau in *My Study Windows*, and to the chapter on the *Concord Writers* in H. A. Beers's *Outline Sketch of American Literature*. Whether in poetry or in philosophy, although he formulated no exact philosophical system, few names rank as high as that of Ralph Waldo Emerson. He was an optimist, an idealist, and withal a shrewd and practical New Englander, modestly self-reliant, and inculcating that trait in others. His beliefs, apparently founded on intuitions, were uttered with an air of gentle authority, and his influence over many minds was most stimulating. Others, unable to discern the esoteric meaning hidden under some metaphor, or under some apparently simple phrase, found him unsatisfactory and obscure. His chief prose works are *Representative Men* and *Essays* on various themes, as Love, Experience, Character, Nature, The Conduct of Life. A visit to England was productive of *English Traits*. His thoughts are tersely and often beautifully expressed, but there is little cohesion in his style. The sentences are so detached that it has been said, doubtless with considerable exaggeration, that if they were read in the reverse order the essays would lose nothing. As a poet Emerson is a close observer and a loving interpreter of nature. His epithets are most felicitous. Among the choicest of his poems are: *Woodnotes*, *The Problem*, *Threnody*, and the *Hymn sung at the Completion of the Concord Monument*. The singular recluse, H. D. Thoreau, was one of the most prominent of Emerson's followers. He persistently shunned mankind, and sought more and more to identify himself with nature. "As we read him," says Lowell, "it seems as if all-out-of-doors had kept a diary and become its own Montaigne; we look at the landscape in a Claude Lorraine glass; compared with his all other books of similar aim, even White's *Selborne*, seem dry as a country clergyman's meteorological journal in an old almanac." Among his works are: *A Week on the Concord and Merrimac Rivers*, *Walden, or Life in the Woods*, *Excursions*, and *The Maine Woods*. Oliver Wendell Holmes is distinguished as a writer on topics pertaining to medicine, his chosen profession, but his fame as the author of humorous and witty prose and verse is even greater. The genial *Autocrat of the Breakfast Table* has found a welcome to the homes of all English-speaking people. Nor has the *Professor* and the *Poet*, who in later years discoursed *Over the Tea-Cups*, been a less honored guest. Dr. Holmes's two novels, *Elsie Venner* and *The Guardian Angel*, in each of which he proposes a professional problem, are somewhat less successful than his other works. As a poet on anniversary and special occasions Holmes has no peer. He has written no less than forty poems for reunions of his own College Class of 1829. *The Last Leaf*, *Dorothy Q.*, *My Aunt*, *The One Horse Shay*, *Parson Turrell's Legacy*, and many other humorous and witty poems are familiar to all. *The Chambered Nautilus* and *The Living Temple* are beautiful masterpieces of his genius, by which he especially desired to be remembered. James Russell Lowell is eminent as poet, satirist, essayist, and critic. His poetry has not the unaffected and transparent simplicity of Longfellow's; its thought is more subtle and occasionally somewhat mystical and obscure. His love of nature is manifest in the charming poem *To the Dandelion*, in *The Vision of Sir Launfal*, with its beautiful description of June, and in the delightful essay on *My Garden Acquaintance*. His power of satire is displayed in *A Fable for Critics*, and in the essay *On a Certain Condescension in Foreigners*. His ardent patriotism finds perhaps its noblest expression in the grand *Commemoration Ode*. His keenly discriminative mental powers, together with his varied and thorough erudition, are admirably shown in *Conversations on Some of the Old Poets*, and especially in his later essays, *Among My Books* and *My Study Windows*. His familiarity with the New England character and dialect is evinced in the *Biglow Papers*, and here and everywhere his wit and humor gleam like golden threads throughout the fabric of his compositions. Bayard Taylor's literary record is noteworthy for versatility, industry, and excellence. His many narratives of journey and adventure are written in an easy and interesting style, and show rare powers of observation. It is as a poet and a translator of poetry, however, that he has won his highest renown. Among many charming lyrics, *Daughter of Egypt*, *veil thine eyes*, *The Bedouin Song*, and the *Song of the Camp* are well-known favorites, and also the lovely idyl, *The Quaker Widow*. Of his longer poems, *Lars*, an idyl in blank verse, and *Prince Demokalion*, rich in varied rhythms, are both masterpieces. His translation of Goethe's *Faust* is a wonderful achievement, preserving all the meters, and faithfully reproducing both the spirit and the sense of the original. He wrote several novels also, in which certain aspects of American life are well depicted. *The Story of Kennett* is usually considered the best. Walt Whitman has been called "a successful poetical iconoclast." His success was only partial, however. His genius was such as to command admiration in spite of his

bizarre and lawless style, but the most beautiful of his poems, such as *My Captain*, *When Lilacs Last in the Door-Yard Bloomed*, and the *Man-of-War Bird*, are those that depart least from accepted models. Although an ultra-democrat in opinion and practice, he has never been much read by the people at large, and his ideas have had little, if any, practical influence upon American literature. Alfred B. Street's *Gray Forest-Eagle* is a fine lyric. John G. Saxe has a facile vein of humor, which reminds one of Hood. *The Proud Miss McBride* and *Dan Phaëthon*, an amusing travesty of the classic fable, are familiar examples of his style. Thos. W. Parson's exquisite *Ode to Dante* is one of the gems of our poetry, and his version of the *Inferno* is most admirable. He has recently translated parts of the *Purgatorio* and of the *Paradiso* also. Dr. J. G. Holland (Timothy Titcomb) was a popular and useful writer in prose and verse. His narrative poems of New England life, *Bitter Sweet*, *Kathrina*, and the *Mistress of the Manse*, though not without some blemishes that critics were swift to note, were widely read and enjoyed. Thos. Buchanan Read's most successful productions are lyrics and idyls. The stirring *Sheridan's Ride* is his best-known poem. George H. Boker excelled as a dramatist, and his lyrical poetry is also of great merit. *Calaynos*, *Anne Boleyn*, *Leonor de Guzman*, and *Francesca da Rimini* are powerful tragedies. *On Board the Cumberland* and *A Ballad of Sir John Franklin* are fine lyrics. Wm. Allen Butler made a decided hit in the satirical poem *Nothing to Wear*. Richard Henry Stoddard's poems are characterized by spontaneity, refinement, and powerful imagination. His *Ode on the Death of Abraham Lincoln* is a masterpiece. *The Fisher and Charon*, the *Hymn to the Sea*, and *The King's Bell* are also among his best productions. His literary criticisms in the *Mail and Express* have for many years been an interesting feature of that paper. E. C. Stedman has written many charming lyrics, as *Pan in Wall Street*, *The Singer*, *The Freshet*, *Country Sleighing*, *The Doorstep*, *Surf*, and *The Discoverer*. *Alice of Monmouth* is an interesting "Idyl of the Great War." In it occurs the favorite *Cavalry Song*. Other fine war poems are *How Old Brown took Harper's Ferry*, *Sumter*, *Gettysburg*, and *Kearny at Seven Pines*. Mr. Stedman is an admirable critic, judiciously discriminative, but, at the same time, more ready to applaud the merits than to discover the defects of his brother-authors. His *Victorian Poets* has reached its 21st edition, and the *Poets of America*, published ten years later, its 11th edition. *The Nature and the Elements of Poetry* is the ripe fruit of the critical studies of many years. The *Library of American Literature* (11 vols.), which he compiled with the assistance of Miss Ellen Mackay Hutchinson, is a collection of great value. Thos. Bailey Aldrich is equally distinguished as a poet and as a prose romancer. All of his work is most exquisitely finished. The dainty poem of *Babie Bell*, published in 1856, at once brought the young author into prominence. *Palabras Cariñosas*, *On the Intaglio Head of Minerva*, and the *Lament of El Moulok* are gems. *Spring in New England* is a beautiful Decoration Day Ode. *Gates Unguarded* is a strong plea against unrestricted emigration. *Mercedes*, a tragedy, was successfully produced in New York in 1893. His prose is humorous, witty, and altogether enjoyable. *The Story of a Bad Boy*, largely autobiographical, delights old and young by its truth to nature. *Margery Daw*, a charming short story, created a sensation by its unexpected ending. Of the longer tales, *The Stillwater Tragedy* is the most powerful. Bret Harte became suddenly famous through his ballads and tales of California mining life, and his *Condensed Novels*, brief and clever travesties of the plots of several popular stories. The most celebrated of his poems are *Plain Language from Truthful James* ("The Heathen Chinese") and *The Society upon the Stanislaus*; and, of the tales, *The Luck of Roaring Camp*, *Miggles*, and *Tennessee's Partner*. His best work is highly artistic, but he sometimes degenerates into sentimentality. Cincinnati Hiner Miller ("Joaquin" Miller) has sung of the Spanish-American life of the South-West, and his poems are full of fire and vivid color. He has great and acknowledged merits and grave defects. Sidney Lanier's passionate love of nature, and especially of trees and of all plant-life, is mirrored in his verse. He delighted in broad, free expanses, in "a message of range and of sweep" from "the marsh and the sea and the sky." His poems are strong, musical, and original. One of the most powerful is *The Revenge of Hamish*. The results of his study of rhythms, measures, and acoustic effects he embodied in a prose volume, *The Science of English Verse*. The lectures of his second course at Johns Hopkins Univ. were published as *The Development of the English Novel*. Richard Watson Gilder's poems evince refined taste and careful finish. He has used the sonnet form with much success, as, for instance, in *Keats*, and in *Father and Child*. *The White Tsar's People* is vigorous and dramatic, and *Sheridan* is a fine tribute to the dead hero. Among others who have successfully invoked the Muse are W. W. Story, Ralph Hoyt, John James Piatt, W. D. Howells, Wm. Winter, John Boyle O'Reilly, Jas. Jeffrey Roche, J. Maurice Thompson, Edward Rowland Sill, Rossiter Johnson, Edgar Fawcett, John Vance Cheney, J. T. Trowbridge, J. H. Boner, H. H. Boyesen, G. P. Lathrop, Chas. De Kay, and H. C. Bunner. Stephen C. Foster, Chas. Godfrey Leonard ("Hans Breitmann"), Chas. Follen Adams ("Yawcob Strauss"), John Hay, Jas. Whitcomb Riley, Will Carleton, Joel Chandler Harris, the brothers Lanier, and Irwin Russell have written dialect verse of various kinds, and the first mentioned, plantation songs, for which he also composed the music. Bronson Howard is the author of several successful plays. Alice and Phoebe Cary sang chiefly of home life and its affections, and their tender poems were warmly welcomed. During the third quarter of the century the sisters dispensed a gracious hospitality to their literary friends in New York City.

Mrs. Anne C. Lynch Botta is the author of a volume of choice poems, and of a *Hand-book of Universal Literature*, and is also remembered as for many years the center of an interesting literary circle in the metropolis. Mrs. Julia Ward Howe, whose several volumes of poetry, the later ones especially, are of a high order of merit, owes her chief reputation to her fine *Battle Hymn of the Republic*. Other gifted women, most of whom have written both in verse and in prose, are Mrs. Emily Chubbuck Judson ("Fanny Forester"), Mrs. C. M. Sawyer, Mrs. Estelle Anne Lewis, one of whose dramas was accepted by Ristori, Mrs. Alice B. Neal (afterwards Mrs. Haven), Mrs. Elizabeth C. Kinney (mother of Edmund C. Stedman), Mrs. Julia C. R. Dorr, Miss Caroline Chesebro, Mrs. Elizabeth Akers Allen ("Florence Percy"), Mrs. S. J. Lippincott ("Grace Greenwood"), and Mrs. Margaret Junkin Preston, one of the sweetest singers of the South. Among those who have contributed to the treasures of our hymnology are Dr. Muhlenberg, Bishops Doane, Onderdonk, and Cox, J. H. Hopkins, Ray Palmer, S. F. Smith, G. W. Bethune, Thos. Hastings, Geo. Duffield, S. W. Duffield, E. H. Sears, S. Longfellow, John S. Dwight, W. Crosswell, A. D. F. Randolph, Mrs. Phoebe H. Brown, Alice and Phoebe Cary, and Mrs. Stowe. In addition to the felicitous translations of Bryant, Longfellow, Bayard Taylor, and Parsons, already noted, we ought to mention Charles Eliot Norton's admirable version of Dante's *Vita Nuova*; translations from various German classics by C. T. Brooks, C. G. Leland, and Emma Lazarus; of Virgil's *Aeneid* by C. P. Cranch; of his *Georgics* by Miss H. W. Preston; and also the exquisite translations of the latter from the Provençal. Miss Mary L. Booth is the author of many valuable translations from the French. During the late war she rendered important service to the Government by translating Count de Gasparin's *Uprising of a Great People*, and other works favorable to the Union cause.

Some of the fine poems inspired by the war have already been mentioned. One of the most remarkable was *All Quiet Along the Potomac*, by Mrs. Ethelinda Beers ("Ethel Lynn"). H. H. Brownell in his *Bay Flight* and in other noble poems celebrated the naval victories, and C. G. Halpine ("Miles O'Reilly") wrote various stirring war ballads. Other favorites are B. Forceythe Willson's *Old Sergeant*, J. J. Piatt's *Riding to Vote*, and Kate Putnam Osgood's *Driving Home the Cows*. On the Southern side were H. Timrod's *Unknown Dead and Charleston*; Father Ryan's *Conquered Banner*; and *The Substitute*, *Stonewall Jackson*, and various other impassioned lyrics, by Paul H. Hayne. Theo. O'Hara's impressive poem, *The Bivouac of the Dead*, although inspired by the war in Mexico, is recalled in this connection. F. M. Finch's beautiful Decoration Day Ode, *The Blue and the Gray*, commemorates the dead heroes of both armies.

The most prominent women writing verse during the last quarter of the century are Mrs. Helen Fiske Hunt ("H. H."), afterward Mrs. Jackson, author also of *Ramona* and *A Century of Dishonor*; Mrs. Celia Thaxter, Miss Lucy Larcom, Mrs. S. M. B. Piatt, Mrs. Elizabeth Stuart Phelps Ward, Mrs. Harriet Prescott Spofford, Mrs. Rose Terry Cooke, Miss Edna Dean Proctor, Mrs. Louise Chandler Moulton, Miss Emma Lazarus, Miss Charlotte Fiske Bates, Mrs. Mary Mapes Dodge, Mrs. M. E. Sangster, Mrs. Rose Hawthorne Lathrop, Miss Kate Putnam Osgood, Miss Edith Matilda Thomas, Miss Nora Perry, Miss Helen Gray Cone, Mrs. Danske Dandridge, and Miss Louise Imogen Guiney.

Foremost among American romancers, especially in the treatment of psychological problems, stands the rare genius, Nathaniel Hawthorne. He traces with a masterly hand the workings of human passion and the retributive power of conscience. His style is admirable for grace and lucidity. *The Scarlet Letter* and *The House of the Seven Gables* are generally regarded as his best novels. *The Marble Faun* is also of great interest, not only as a romance, but incidentally as a guide to the understanding and appreciation of many of the art treasures of Rome. *Our Old Home* is a delightful picture of England and the English. *Twice-Told Tales* and *Mosses from an Old Manse* are collections of charming sketches. Hawthorne has also written several fascinating books for children, *Grandfather's Chair*, *The Wonder Book*, and *Tanglewood Tales*. In 1852 was published a book, which, owing largely to the popular interest felt in its theme, produced an unprecedented sensation, Mrs. H. B. Stowe's *Uncle Tom's Cabin*, a powerful and pathetic story of negro slavery. It has been translated into all the languages of the civilized world, has been frequently dramatized, and is still a favorite book in circulating libraries. *Old Town Folks* is the best of Mrs. Stowe's other fictions. Mrs. A. C. Mowatt (afterward Mrs. Ritchie) is remembered as an actress of ability, and as author of *Mimic Life*, of the comedy of *Fashion*, and of an interesting *Autobiography*. Susan Warner's *Wide, Wide World*, *Queechy*, and *The Old Helmet* were warmly welcomed. John Esten Cooke's *Virginia Comedians* and Robert T. S. Lowell's *New Priest of Conception Bay* are two fine novels that appeared shortly before the war. Geo. Wm. Curtis's charming *Nile Notes* and *Lotus-Eating*, his society satire, *The Potiphar Papers*, and Fitz Hugh Ludlow's *Hasheesh-Eater* were also published about this time, as well as Donald G. Mitchell's delightful *Dream Life and Reveries of a Bachelor*. Jas. Parton was a frequent and favorite contributor to the magazines and the writer of many biographies. His wife, Sarah Payson Willis ("Fanny Fern"), sister of N. P. Willis, was unsurpassed as a sketch writer. Her sensible and often caustic short articles in the *New York Ledger* were deservedly famous. Mary Abigail Dodge ("Gail Hamilton") has employed a pungent pen on political and social subjects. Among the professed humorists are C. F. Browne

("Artemus Ward"), a most droll and eccentric genius; D. R. Locke ("Petroleum V. Nasby") and R. H. Newell ("Orpheus C. Kerr"), both of whom by their witty sarcasms did good service to the Union cause; and Henry W. Shaw ("Josh Billings"), whose shrewd sayings might well spare the peculiar spelling adopted in order to call attention to them. Edward Everett Hale is a prolific and versatile writer. Several of his short stories are celebrated, and especially *The Man without a Country*. He usually writes with a philanthropic purpose. Numberless clubs for beneficent work have been organized on the plans described in his *Ten Times One is Ten*. Mr. Hale has also made various contributions to history. Thomas Wentworth Higginson has written much in advocacy of Woman Suffrage. He is the author also of a graceful romance, *Malbone*, of *Oldport Days*, a pleasing volume of reminiscences, and of various other works. William Dean Howells is one of the most eminent representatives of the realistic school of fiction. The types he selects are drawn with uncommon skill, but he has not unjustly been criticised for depicting so many commonplace characters, and especially for presenting so persistently the same type of woman. His silly, illogical heroines are quite in place in his delightful farces, but in real life, surely, a sensible woman is not such a rarity as in Mr. Howells's novels. *Venetian Life* and *Italian Journeys* are charming records of observations made during his consular career in Italy. Mr. Howells is also the author of critical essays on the *Modern Italian Poets*, and of *Criticism and Fiction*, a reprint of articles contributed to the editor's study of Harper's Mag. A recent volume of poetry, *Stops of Various Quills*, shows that he has not forsaken his early muse. Henry James has lived and studied so long abroad that he is a thorough cosmopolitan. With every advantage of liberal culture, his style is most polished, graceful, and clear. He is a leader in the realistic school of fiction and the inventor of the so-called "international novels." He has successfully dramatized several of his novels, and his short stories are remarkably bright and clever. As a critic he is genial, generous, and free from all offensive assumption of superiority. His *French Poets and Novelists* and *Partial Portraits* are two most enjoyable books. Francis Marion Crawford is another veritable cosmopolitan. Since 1882 he has produced nearly two novels a year, many of them of marked ability. The trio of novels of Italian life, *Saracinesca*, *Sant' Ilario*, and *Don Orsino*, are among his best. He composed two novels, *Zoroaster* and *Marzio's Crucifix*, in French as well as in English, and was signally honored by the award of 1000 francs from the French Academy in acknowledgment of the excellence of these and of his other works. Chas. Dudley Warner is the author of many delightful essays and interesting sketches of travel, all sparkling with spontaneous wit. More recently he has written several novels. The last, *A Golden House*, is a graphic representation of life in New York City. Elizabeth Stuart Phelps Ward is an earnest, able, and prolific writer in prose and verse. Her *Gates Ajar*, discussing the conditions of the future life, appeared soon after the war. It was widely read, and with deep interest. The *Story of Avis* is esteemed her best novel. Louisa May Alcott, after publishing *Hospital Sketches*, *Moods*, a novel, and two other works, scored an immense success in *Little Women*, a story for girls, published in 1868, and from that time to the day of her death, twenty years later, her pen was in constant demand. Her style is bright and piquant, and her thoroughly wholesome stories faithfully represent New England life. Mrs. A. D. T. Whitney, too, has won her chief successes in stories for girls, as *Faith Gartney's Girlhood* and *A Summer in Leslie Goldthwaite's Life*. Her *Mother Goose for Grown Folks*, in humorous style, invests the familiar rhymes with much esoteric meaning. Mrs. Frances Hodgson Burnett's most popular novel is *That Lass o' Lowrie's*, the scene of which is laid in Lancashire. Her *Little Lord Fauntleroy* was read with delight by old and young, and this and some of her other works have been successfully dramatized. *The One I Knew Best of All* is an attractive autobiography of her childhood. Constance Fenimore Woolson has written several interesting novels, the scenes of most of them being in Florida. *East Angels* is, perhaps, the best. Edward Eggleston's principal tales are of Western life, *The Hoosier Schoolmaster*, *The Circuit Rider*, *Roxy*, and *The Graysons*. Of late years he has been busied with writing history. George W. Cable, with his graphic and delightful pictures of Creole life, introduced quite a new element into American literature. His most powerful work is *The Grandissimes*. *John March, Southerner*, presents many charming pictures of Southern life, but is lacking in unity. Miss Mary Noailles Murfree ("Charles Egbert Craddock") in her admirable novels and tales of the Tennessee Mountains has also made a distinct addition to our literature. S. L. Clemens ("Mark Twain") is one of our most popular humorists. *The Innocents Abroad* and *Roughing It* are well-known examples of his unique and original style. The inimitable Francis R. Stockton is another thoroughly original genius. The *Rudder Grange* stories, *The Casting Away of Mrs. Lecks* and *Mrs. Aleskine*, with its sequel, *The Dusantes*, and the celebrated short story, *The Lady or the Tiger*, are some of his best works. Other well-known writers of fiction are Mrs. Terhune ("Marion Harland"), J. R. Gilmore ("Edmund Kirke"), H. Melville, A. W. Tourgee, Mrs. Eliza Stoddard, Anna Katharine Green (Mrs. Rohlfs), Julian Hawthorne, W. M. Baker, E. P. Roe, Gen. Lew Wallace, whose Ben Hur met with a phenomenal success, Blanche Willis Howard, Mrs. Amelia E. Barr, Sallie Pratt McLean, H. H. Boyesen, A. S. Hardy, Edward Bellamy, T. A. Janvier, Edw. Lassetter Bynner, Mrs. Mary Hartwell Catherwood, S. Weir Mitchell, Mrs. Amélie Rives Chanler, Sarah Orne Jewett, Mary E. Wilkins, Mrs. Margaret W. Deland, Mrs. C. Burton Harrison, Richard Harding Davis, and Henry

B. Fuller. Thos. Nelson Page, James Lane Allen, Francis Hopkinson Smith, Richard Malcolm Johnston, Harry Stillwell Edwards, and Joel Chandler Harris have successfully cultivated the short story, Harris, as "Uncle Remus," having also a special field of his own. Agnes Repplier is the author of *Points of View, Essays in Idleness*, and other bright and suggestive sketches. William Winter has published various interesting books. *Gray Days and Gold* is a collection of essays and poems commemorative of rambles in the British Isles. John Burroughs has long written delightfully of the phenomena of out-door life, and has recently turned his attention also to *In Door Studies*. John Muir, who described the *Mountains of California*, Emerson considered as even "more wonderful than Thoreau." Wilson Flagg and Mrs. Olive Thorne Miller have written charmingly of birds. Dr. Wm. C. Prime's *Along New England Roads* and *Among the Northern Hills*, and William Hamilton Gibson's *Sharp Eyes* and other studies in natural history and in botany, are most enjoyable reading, and the drawings of the latter in illustration of his text are exquisite.

In the department of history a vast amount of work has been done, and with most valuable and brilliant results. Geo. Bancroft's great *Hist. of the United States* was begun in 1834 and the revised edition was completed in 1884, just half a century later. It ends with the year 1789, when Washington became first president of the Republic. The style is succinct, but lucid and impressive. John G. Palfrey's *Hist. of New Eng. under the Stuart Dynasty* (5 vols.) is a most scholarly and excellent work. Richard Hildreth's six-volume *Hist. of the U. S.* extends to the close of Monroe's first administration (in 1820). It is clear and accurate as to facts, but somewhat tinged with partisan prejudice. It covers a period which until recently had not been so fully treated elsewhere, but the greater part of this period is included in Henry Adams's able *History of the U. S. during the Administrations of Jefferson and Madison* (9 vols., 1889-90). Justin Winsor has edited a *Narrative and Critical Hist. of America*, consisting of monographs by various authors. T. W. Higginson has written several historical works, among them a very delightful *Young Folks' Hist. of the U. S.*, and also a *Larger Hist. of the U. S.* to the close of Jackson's Presidency. John Fiske has made various valuable contributions to our history, one of most absorbing interest being *The Critical Period of the U. S. (from 1783 to 1789)*. Jas. Schouler's *Hist. of the U. S. under the Constitution* and John Bach McMaster's *Hist. of the People of the U. S. from the Revolution to the Civil War* both treat of the social and economic life of the American people. Neither work is yet completed. Jas. Ford Rhodes's *Hist. of the U. S. from the Compromise of 1850* has in the third vol. reached the year 1862. The literature connected with the civil war is naturally voluminous. Besides innumerable biographies and autobiographies of distinguished leaders in the conflict, we have Vice-Pres. Wilson's *Rise and Fall of the Slave Power in America*, J. W. Draper's *Amer. Civil War*, Greeley's *American Conflict*, the *War Papers* of the Century Co., Lossing's *Field-Book of the Civil War*, Swinton's *Army of the Potomac*, Moore's *Rebellion Record*, Seward's *Diplomatic Hist. of the Civil War*, Adm. Porter's *Naval Hist. of the Civil War*, A. H. Stephens's *Const. View of the War between the States*, Jefferson Davis's *Rise and Fall of the Confed. States*, and Pollard's *Lost Cause*. *The Story of the Civil War*, by the eminent military critic John Codman Ropes, of which vol. I. only has been issued, will doubtless be a valuable work. H. H. Bancroft's *Hist. of the Pacific Coast*, in 39 vols., is a vast treasury of materials gathered by many assistants and revised by the author. Several of our most brilliant historians have selected for their themes interesting epochs of history more or less related to our own country. Francis Parkman's series of histories, beginning with the *Conspiracy of Pontiac*, published in 1851, and ending with *A Half Century of Conflict*, published in 1892, recount the rivalry between France and England in colonizing North America. In William H. Prescott's *Ferdinand and Isabella, Conquest of Mexico*, and *Conquest of Peru* are narrated the discovery of America, and the history of some of the most important Spanish settlements in the New World. His *Philip the Second* is incomplete. Motley has written of the *Rise of the Dutch Republic*, *Hist. of the United Netherlands*, and *Life and Death of John of Barneveld*. These three great writers all unite brilliant descriptive powers with accuracy and soundness of judgment, and their works are of fascinating interest. Motley is usually regarded as our ablest historian, and his productions are well-nigh flawless. It has, however, we fear, been justly charged that his admiration for his illustrious hero, William the Silent, makes him at times unduly severe in his judgment of Spain, and that his Unitarian bias causes him, though doubtless without intention, to be decidedly unfair to the Calvinists in his account of the contest between the followers of Prince Maurice and those of Oldenbarneveld. Captain A. T. Mahan has gained enviable distinction at home and abroad by his works entitled *The Influence of Sea Power upon History (1666-1783)* and *The Influence of Sea Power upon the French Rev. and Empire (1793-1812)*. *The Times* (London) calls him "the greatest living writer on naval history." We can but mention John Foster Kirk's *Hist. of Chas. the Bold of Burgundy*, Theodore Roosevelt's *Naval War of 1812*, Josiah Royce's *California*, Mrs. Martha J. Lamb's *Hist. of New York*, Eugene Schuyler's *Hist. of Peter the Great*, and Douglas Campbell's *The Puritan in England, Holland, and America*. Geo. Ticknor's *Hist. of Spanish Literature* is a standard work. Prominent writers on Church Hist. are G. P. Fisher, H. C. Lea, and Philip Schaff; on psychology, Jas. McCosh, John Fiske, Mark Hopkins, Noah Porter, and J. H. Seelye; on political economy, H. C. Carey.

F. Lieber, F. Bowen, F. A. Walker, and Edw. Atkinson; on science and natural history, J. D. Dana, O. C. Marsh, Asa Gray, L. Agassiz, A. H. Guyot, M. F. Maury, S. F. Baird, Elliott Coues, J. W. Draper, Simon Newcomb and C. A. Young; on international law, Theodore D. Woolsey; on philology and the English language, W. D. Whitney, G. P. Marsh, F. A. March, Jas. Hadley, Rich. Grant White and T. R. Lounsbury; on ethnology, D. G. Brinton. Distinguished theologians and writers on religious subjects are Chas. Hodge, A. A. Hodge, R. D. Hitchcock, Tayler Lewis, H. B. Smith, H. Bushnell, H. W. Beecher, Jos. P. Thompson, Austin Phelps, Elisha Mulford, Phillips Brooks, Lyman Abbott, G. D. Boardman, E. H. Sears, H. W. Bellows, Thos. Starr King, Jas. Freeman Clarke, and O. B. Frothingham.

A glance over the field shows that there was little of pronounced American literature until near the time of the war for independence. What we had was mostly religious disputation. The stamp act aroused the people and filled the land with political literature, some of it of excellent quality; but there was little else until long after the revolution. It should be remembered that the conditions of a new country are never favorable to literary culture. The man who has to clear away the forests, build his cabin, and plant and gather crops knows little of the "groves of Academe." It is not a little to the credit of Americans that within the first century of the hard, practical work of subduing a wild country, they have found or made leisure to do anything in the way of high literature. Now a literary class is taking its place as one of the institutions of our social life. Science, art, the profoundest philosophy, the most careful linguistic criticism and study, already challenge for America an equal place with the foremost nations of Europe.

Authorities recommended: E. A. and G. L. Duyckinck, *Cyc. of Amer. Lit.*; Moses Coit Tyler, *Hist. of Amer. Lit.*; C. F. Richardson, *Amer. Lit.*; Davidson, *Living Writers of the South*; Mrs. M. T. Tardy, *Southland Writers*; J. Nichol, *Amer. Lit.*; H. A. Beers, *Outline Sketch of Amer. Lit.*; E. C. Stedman, *Poets of America*; D. Sladen, *Younger American Poets*; H. C. Vedder, *American Writers of To-day*; S. L. Whitcomb, *Chron. Outlines of Amer. Lit.*

AMERICAN MUSEUM OF NATURAL HISTORY, incorporated by the legislature of New York in 1869, open free, situated near the Central Park, New York. This institution was begun by private citizens, but is public in its nature, and is constantly receiving donations from private sources and from officers of the government. In 1874, a building was begun which when completed will surround a plot of 18½ acres. The portion finished is four stories high, with exhibition halls 170 by 60 ft. Among its attractions are collections of shells, skeletons of rare animals, building stone from Japan, woods from Bermuda, skeletons of man and other animals, a great variety of living mammals, birds alive and dead, archaeological relics from the Pacific islands, war instruments from savage nations, models of cliff dwellings of Colorado, pottery of the mound-builders, implements from the lake dwellings of Switzerland, stone implements from the valley of the Somme, skeletons of extinct gigantic birds. Geology is largely represented.

AMERICAN PARTY. See KNOW-NOTHINGS.

AMERICAN RIVER, in n. central California; its n. and s. fork are in the w. part of Eldorado county. It flows s.w. and joins the Sacramento a little above Sacramento city.

AMERICAN SYSTEM. See TARIFF.

AMERICAN UNIVERSITY, an institution of higher learning, chartered in 1893 and located in Washington, D. C. It is under the direction of the Methodist Episcopal church and is designed to further post-graduate study. It has a fine site of 90 acres, and the plans include a series of colleges for history, language and literature, philosophy, the several sciences, technology, sociology and economics, law, civics, medicine, scientific temperance, art, religion, and other departments. To all the courses the Bachelor's degree is required as the standard of admission. The endowment amounted, in 1896, to \$1,040,000 and in May, 1897, work on the building for the College of History was far advanced. Chancellor, 1897, John F. Hurst.

AMERICAN WINES. The earliest production of wines in America appears to have been about the middle of the 16th century in Florida from the wild grapes still so abundant there. Grape-growing was tried by the early English settlers in Virginia, but did not continue as a business. Thirty years later, however, wine was made there, and special rewards were offered to sustain the business. The first English governor of New York in 1664 granted to one Richards, a wealthy citizen, the privilege of selling native wines without tax, and he undertook grape culture upon an extended scale. About the same period wine was made in Delaware, and its production was tried but failed under the auspices of William Penn, though it succeeded in New Jersey. The early French settlers in Illinois made wine in considerable quantity before the close of the 18th c.; and the Harmonists, who settled in Pennsylvania in 1803, being Germans, naturally went into the business, taking it with them to Indiana. There is hardly a state of the union out of New England in which grape-growing has not been tried with success. The wine was brought to southern California by the early Jesuit missionaries, who planted cuttings at first, but as these did not fulfil their expectations, they tried the seeds found in raisins, and from these came the abundant and prolific Los Angeles grape.

For more than 100 years efforts have been made to grow European varieties of grapes in the open air in all parts of this country but this has always resulted in failure, except in certain districts of California, where choice varieties of French and German grapes come nearer reproducing themselves than in any other parts of the country. In recent years more attention has been given to improving the native vines, which has resulted in a number of valuable varieties. The area of the grape-growing industry in the U. S. may be divided into five sections, as follows: the Eastern division comprising 51,000 acres in cultivation in New York, New Jersey and Pennsylvania; the Middle division of 42,633 acres in Illinois, Indiana and Ohio; the Western division of 17,306 acres in Kansas and Missouri; the Southern division of 17,092 acres in Georgia, North Carolina, Tennessee and Virginia; and the Pacific division of 213,230 acres in California, Arizona and New Mexico. Outside of these divisions there are about 45,000 acres under cultivation in various parts of the U. S. which are chiefly in small experimental vineyards. The census of 1890 gives the following figures as to the production of grapes and amount of wine manufactured in the census year. About four-fifths of the grapes grown in all but the Pacific district are sold for table use or for making raisins, and the following figures are merely for the amount of grapes used in producing wines.

Division.	Grapes, Tons.	Wine, Gallons.
Eastern.....	15,172	2,258,250
Middle.....	14,456	2,409,333
Western.....	8,290	1,380,990
Southern.....	6,995	1,165,832
Pacific.....	173,037	14,947,500

Including the amount of wine produced from small vineyards outside these districts the total production for the census year was 24,306,905 gallons of wine. For the same year the production of California was 14,626,000 gallons or a little less than two-thirds of the product of the U. S. The coast district of California produces the finest grade of white and red dry wines and the finest varieties of French champagne grapes, which have proved a very profitable crop. Champagne has been made in this district for over 30 years and is of a very good quality. Owing to the conditions of the trade, much of this champagne is shipped abroad, where it appears under a foreign label, and for this reason California champagne does not bear the reputation which it really deserves. One cellar in this district has a capacity of 800,000 bottles and the champagne is produced by natural fermentation in the bottle. The Sierra Nevada foothills and Sacramento valley produce good wholesome dry wines but not of the same quality as the French and German types, and the southern district of the state excels in Port, Muscatel, Angelica and other sweet heavy wines. In 1895 and 1896 there was considerable shortage in the vintage, which resulted in a marked advance in the prices of California wines. A number of diseases, chiefly the phylloxera, which have attacked the vines have caused the shortage, in the crops, and during the same time but few new vineyards have come into bearing. Over 200 kinds of grapes have been tried in California, but the principal new graftings are the Cabernet, Mondeuse, Syrah, Bouchet, Mataro and Carignan for red wines, and for white wines the Folle Blanche, Riesling, Sauternes and Chasselas. The process of wine making in one of the largest of the California vineyards is as follows: About Sept. 1, the pickers, each with a basket, begin work, followed by a wagon to receive their gatherings. When loaded with a ton and a half of fruit the wagon is drawn to the press. The grapes are first cast into a sieve with meshes about three quarters of an inch square. This sieve is the "stemmer," and as workmen with wooden hoes draw the bunches to and fro, the berries drop through the meshes, and the stems are left in the sieve. From the stemmer the berries drop into the hopper just below, at the bottom of which are two rollers, separated from each other about three sixteenths of an inch. These break the skins of the grapes and, to a certain extent, mash the pulp. Immediately below the rollers is a receiver, a long wooden box with a false bottom, and into this the broken berries fall. A large part of the juice drains from them and is pumped into vats to ferment for the purpose of making white wine. Remaining in the receiver is a mass of pomace. If red wine, such as claret or burgundy, is desired, this pomace is placed in vats. If white wine only be wanted, then it is taken at once to the press and all the juice in it extracted. The first thing to be done with the juice is to bring it to fermentation. For red wine the pomace is not pressed as it comes from the receiver, but is placed in a large vat, filling the vat about four-fifths full. On top is placed a cover, held in place by four screws, and pierced with a great many little holes. On the second day the fermentation begins, and the wine commences to rise through the holes and swell up in the vat. The pomace being kept down by the cover, and being covered with wine, cannot come in contact with the air; if it did it would sour and spoil the wine. At the end of six or seven days the fermentation subsides, and the wine is drawn, or "racked," off into casks, which are kept full all the time. A second fermentation then takes place, which continues for three or four weeks, during which time the bung-holes of the casks are kept partly open, to allow the gases to escape; then the wine is ready for storage. The lees that remain after the wine is racked off are gathered and allowed to settle once more, and the second drawing is used to give body to light wines, or distilled into brandy. The process of making white wine differs from the former in only the preliminaries. The juice which runs from the grapes at first, and that which

is expressed from the new pomace, is pumped into casks to ferment. The fermentation begins in about two days' time, and continues about six or seven days; during that period it discharges through the bung-hole of the cask a thick, greenish-yellow matter of the consistency of molasses. This is the vegetable matter remaining in the wine, and it has to be cleaned off twice a day. The casks, too, are kept filled with new wine all the time, in order to prevent any of the vegetable matter souring. Fermentation having ceased, the after operations are the same for both red and white. After the wine has lain in casks four or five months, it is once more racked off into fresh casks, and the sediment, amounting to about ten per cent., left behind. This is all thrown together and allowed to settle again. During the first year this racking takes place three times. A curious thing is that during the first year, about the time when the vines begin to throw out their branches, the wine undergoes what is called the after fermentation, and changes itself for the last time. During the second year the wine is racked twice, and during the third once. It is then fit for market.

For making sherry the grapes are allowed to hang upon the vine until about the middle of Nov. They are picked about two hours after sunrise, when thoroughly dry, and are taken to the press. The juice which flows from the machine is very sweet, and runs into vats placed in the warmest part of the cellar. Here fermentation takes place as with other wines; but in order to prolong this process as much as possible the juice is stirred three or four times a day. After five or six months it is racked off into fresh casks, and these are taken to a hot-house, and exposed to the heat of the sun. The house is kept at a heat from 130° to 140° F., and in this temperature the wine remains for six or eight months. During the time the casks are rolled over three or four times every week. This continued exposure to the influence of heat develops in the wine that dry flavor so much admired by connoisseurs of sherry; it also loses no small part of its strength. From the hot-house the wine is taken back to the cellar, where it is kept for six or seven months more at a temperature of about 65°, during which time it often happens that a second and milder fermentation takes place. If the wine is intended to be cheap sherry, it is then ready for market. If it is intended to be a finer and more expensive grade of wine, during the following summer it is again placed in the hot-house, and subjected to the heat of the sun.

Another process of manufacturing sherry is much more rapid than that described, although the result may not be so satisfactory to a lover of wine. It is called the Searle process, and is patented. In it the vats containing the wine are connected with pipes and have coils of pipe in them. Through these, steam is forced, and produces the necessary heating of the wine and expulsion of the alcohol. By this process the sherry is ripened much sooner than in any other way.

AMERICUS, city and co. seat of Sumter co., Ga.; 70 m. s. s. w. of Macon, on the Central of Georgia and the Georgia and Alabama railroads. It has several churches, a business college, high schools, a public library, etc. It is in a cotton and sugar cane district. Pop. '90, 6335.

AMERIGO VESPUCCI, a naval astronomer, from whom America accidentally received its name, was b. at Florence, Mar. 9, 1451. His father was a notary. The education of A. was intrusted to his uncle, Giorgio Antonio Vespucci, a monk and apparently a man of superior enlightenment. The youth made but indifferent progress in his Latin grammar, though he showed great aptitude and liking for natural philosophy, astronomy, and geography—at that period, favorite objects of study, on account of their commercial importance. It is not precisely ascertained when he first went to Spain. We find him there, however, in 1486, engaged in mercantile pursuits. He was at the head of a large Florentine firm in Seville in 1496, when Columbus was making preparations for a second voyage to the new world. The success of the great discoverer inflamed A. with a passion for discovery, and having abandoned "business," he sailed from Cadiz on the 20th May, 1499, in the expedition commanded by Admiral Hojeda, and, after a voyage of 37 days, arrived at that portion of the continent of America now called Cumana, explored the bay of Paria, lying between the isle of Trinidad and the mainland, and some hundreds of miles along the coast. He returned in the autumn of the same year, but commenced a second voyage under Admiral Pinzon in Dec., which resulted in the discovery of a crowd of small islands on the s. of the gulf of Mexico. He was now allured by promises into the service of Emanuel, king of Portugal, and undertook two other voyages with Portuguese ships; the first on the 10th of May, 1501, and the second on the 10th of May, 1503. His purpose was to sail westward, in hopes of discovering a passage to Malacca, the extreme point of discovery in the e. He lost one of his ships; and it was only after encountering great perils that the other five found refuge in All Saints' bay, on the coast of Brazil. The monarch gave orders that some remains of the ship *Victoria*, in which A. made his last voyage, should be suspended in the cathedral of Lisbon, but fulfilled none of the promises which he had made. A. consequently returned to Spain, and in the year 1508 succeeded in obtaining the office of piloto-major. He died at Seville on the 22d of Feb., 1512.

The character of A. V. has been covered with a great deal of unmerited obloquy. He has been accused of endeavoring to claim the honor of discoveries which he never made, and has been commonly regarded as an unprincipled adventurer. Humboldt, however, has successfully vindicated him from such aspersions. He had a very considerable knowledge of various branches of science, and it was on account of his superior attainments in these that he was selected to accompany the expeditions as naval

astronomer. He was a prompt and skillful inspector of the commissariat while under his control; vigorous, practical, and severe in his demands for increased knowledge on the part of the naval functionaries under him; an earnest navigator and close friend of Columbus in the last years of the great admiral's life. How America came to receive its name from him is not quite clear; but it is certain, from Humboldt's investigation, that A. himself had nothing to do with it. The name of the new world probably came from Germany. A selection from A.'s narrative of his American voyages found its way into that country. Martin Waldseemüller of Freiburg in Baden translated it for a bookseller of St. Diez in Lorraine. As the first account of the wonderful discovery, it was greedily devoured. Edition after edition was printed off, and, according to Humboldt, it was Waldseemüller who proposed that the new world should be called America in honor of the author. Afterwards, this name was generally employed by geographical writers, and even the Spaniards and Portuguese adopted it.

AM ERSFOORT, an ancient t. in the Netherlands, province of Utrecht, on the Eem, which flows into the Zuiderzee, has a large trade in grain. Tobacco is grown in the district, and cotton and woolen goods, leather, soap, beer, etc., are manufactured. The church of St. Joris was completed in 1248. A. has a Jansenist college and court of justice. Here the statesman Oldenbarneveld, and the architect of the palace in Amsterdam, Jacob van Campen, were born. Pop. (1890) 15,694.

AMES, ADELBERT, b. Me., 1835; graduated at West Point, 1861; distinguished himself in several engagements during the war, rising to be brevet major-general, U. S. A.; was appointed provisional governor of Mississippi, 1868; elected U. S. senator from that state, 1870; governor, 1874; was impeached and resigned, 1876, removing to Minnesota. He received the degree of LL.D. from Brown University in 1892.

AMES, EDWARD R., D.D.; 1806-1879; bishop of the Methodist Episcopal church. In 1826 he entered Ohio university. In 1828 he opened a high school at Lebanon, Ill., the germ of McKendree college; in 1830 he became an itinerant preacher of the Indiana conference; he was a delegate to the general conference in 1840, and afterwards corresponding secretary of the missionary society for the south and west. From 1844 to 1852 he was presiding elder of the Indiana conference, and was elected bishop in 1852. He was the first Methodist bishop to visit the Pacific coast.

AMES, FISHER; 1758-1808; b. Mass.; son of Nathaniel Ames; graduated at Harvard in 1774. He practiced law, and went into politics. In 1788 he bore a distinguished part in the Massachusetts convention to ratify the federal constitution, pleading with rare eloquence for the adoption of the new organic law. His first political ventures were in essays in the newspapers signed "Camillus" and "Brutus," and, when the authorship became known, it gave him a place among the most prominent federalists. When the new government went into operation he was the first representative in congress for the district including Boston, and he served through Washington's administration, taking high rank among the orators of the time. After leaving congress he took no prominent part in politics, though his pen was frequently employed. He pronounced the eulogy on Washington before the Massachusetts legislature. He spent his last years of failing health in retirement. He always had gloomy forebodings of the destiny of his country, as, in common with many federalists of his time, he doubted the permanent vitality of a republican form of government. His orations, essays, letters, etc., have been published by his son. He was attractive in appearance and gentle in manners.

AMES, JOSEPH, 1816-72; b. N. H.; an American portrait painter, working many years in Boston, where he made portraits of Daniel Webster, Pius IX., Rachel, Rufus Choate, and others. His *Death of Webster* is well known.

AMES, OAKES (1804-'73), was born in Easton, Massachusetts. He learned the trade of blacksmith in his youth, and in later life acquired great wealth in the manufacture of agricultural implements. He was member of congress from 1864 to '73, and was eminent for sound judgment in financial matters. He was largely concerned in the construction of the Union Pacific railroad, and in the Credit Mobilier (q.v.).

AMES, OLIVER, financier; 1831-95, b. North Easton, Mass.; son of Oakes and grandson of Oliver. He was brought up in his father's manufactory; brought his father's estate from chaos; paid off \$8,000,000 of obligations and \$1,000,000 of legacies; and was lieutenant-governor of Massachusetts four times and governor three times.

AMESBURY, t. in Essex co., Mass., on the Boston and Maine railroad, 42 miles n. e. of Boston. It is connected by electric railroads with Haverhill, Merrimac and Newburyport, the last of which is five miles distant. It has extensive manufacturing of carriages, of cloth, hats, shoes, and bicycles. There are banking facilities, public schools, and newspapers. It is the home of the poet John Greenleaf Whittier. Pop. '90, 9798.

AM ETHYST, a variety of quartz (q.v.) differing from common quartz and rock-crystal chiefly in its beautiful violet-blue or purplish violet color—well known as *amethystine*—which is owing to the presence of a little peroxide of iron or of manganese. It is one of the most esteemed varieties of quartz, and is much employed for seals, rings, etc., although, being comparatively abundant, it is much inferior in price to the true gems. An amethystine tinge is frequently to be observed in specimens of quartz, which yet are not perfect A. The tinge is often very faint, and is frequently confined to the summits or edges of the crystals. The finest specimens of A. are brought from India,

Ceylon, and Brazil. It is, however, a common mineral in Europe, and occurs in many parts of Scotland. It frequently occurs lining the interior of balls or geodes of agate, and in veins and cavities in greenstone and other rocks. The ancients imagined it to possess the property of preventing intoxication, and persons much addicted to drinking therefore wore it on their necks. The name is derived from a Greek word which signifies *unintoxicated*.—Not to be confounded with this mineral is that sometimes called the *oriental A.*, which is a variety of spinel (q.v.) having an amethystine color, and is a very valuable gem. False A. made of glass or *paste* are very common, and in general very coarse; but a very perfect imitation can be and sometimes is made.

AMGA', a river of Siberia, rising in the Yablonnoy mountains, running n.e. about 460 m. and joining the Aldan, one of the tributaries of the Lena. At Amginsk its breadth is 3000 ft.

AMHARIC LANGUAGE, named from the important province of Amhara; the principal tongue of Abyssinia; with some variations of dialect, used throughout the kingdom. It is of ancient Semitic stock, and related to the old Ethiopian or Geez, which had prevailed until the 14th century. Its alphabet is the Ethiopic with some added letters; and like that language, it strongly resembles the Arabic, though with the mixture of many African words. It is not an important literary language, but the Bible and many other works have been written in it. See **AFRICAN LANGUAGES**.

AMHERST, a co. in w. central Virginia, between the James river and the Blue ridge; 418 sq. m.; pop. '90, 17,551, inclu. colored. It has charming scenery and fertile soil; the chief products are wheat, corn, oats, tobacco, and butter. The Virginia and Midland and Richmond and Alleghany r. rs., intersect it. Co. seat, Amherst.

AMHERST, a town in Hampshire co., Mass., 24 m. n. of Springfield on a branch of the Connecticut river, on the Boston and Maine and New London and Northern railroads. It contains many churches, straw hat and other factories, and has a high school and good banking facilities. The scenery is picturesque, with beautiful views of Mount Holyoke and other mountains. It is the seat of the Massachusetts Agricultural college, with its large greenhouses and the Durfee plant-house, one of the most successful agricultural schools in the country. Amherst College was founded here in 1821. (See **AMHERST COLLEGE** and **MASSACHUSETTS AGRICULTURAL COLLEGE**). Pop. '90, 4512.

AMHERST, JEFFERY, Baron, 1717-97; a British general; present at Fontenoy on the staff of Gen. Ligonier, and sent to America in 1758 with the rank of major-general. With Wolfe and Prideaux he conquered all the strongholds of the French in Canada, for which he was thanked by the House of Commons, and granted the order of K. B. Soon afterwards he was made commander-in-chief of the English forces in America; in 1763 he was appointed governor of Virginia, and in 1770 governor of the island of Guernsey. In 1776-82 and 1793-95 he was commander-in-chief of the British armies, but, being superseded by the duke of York, he was made a field-marshal. In 1776 he was made a peer as Baron Amherst of Holmesdale, and in 1787 was patented Baron Amherst of Montreal.

AMHERST, a township of Erie co., N. Y., includes Williamsville and other villages. It is in a wheat and corn growing district and produces natural gas. Pop. '90, 4014.

AMHERST, WILLIAM PITT, Earl of, 1773-1857. In 1816, he was sent ambassador to China where he refused to perform what he thought a degrading act of kneeling, called *ko-tou*, which was required of all who would see the emperor. For this he was not allowed to enter Peking, and the object of his mission was frustrated. On the way home he was wrecked. Another ship in which he returned to England touched at St. Helena, where he had several interviews with Napoleon. He was governor-general of India, 1823-28, and was created earl in 1826.

AMHERSTBURG, a t. in Essex co., Ontario, Canada, on the Detroit river six miles above its junction with Lake Erie. It is one of the oldest settlements in upper Canada, being named from Lord Amherst. It occupies the s. w. extremity of the province. It is a port of entry, was formerly a garrison town, is connected with Detroit, Mich., by a steamer line, and has a court house, lunatic asylum, public library, electric lights, water works, iron manufactures, several hotels, and flour, saw and planing mills. Pop. '91, 2279.

AMHERST COLLEGE, at Amherst, Hampshire co., Mass., was founded in 1821 by Congregationalists, in the interest of Christian education. About 4,000 men have been graduated from its four-year courses of liberal study; of whom about 1200 have been clergymen, and about 125 foreign missionaries. Its faculty numbers 35 professors and instructors; its undergraduates (1896), 435. Its 17 college buildings have cost about \$650,000. Its laboratories, museums of science, archaeology and art, and its library, contain collections valued at about \$200,000. The entire property under its control is about \$2,500,000. Of its funds, the income of \$200,000 is devoted to scholarship aid for needy and deserving students. The annual income of the college is about \$105,000. Among the most generous donors to the college have been, Dr. William J. Walker, \$250,000; Samuel Williston, \$200,000; Samuel A. Hitchcock, \$175,000, and D. Willis James, over \$250,000. The beautiful Gothic church was given by William F. Stearns, the son of President William A. Stearns. The library has 65,000 volumes. The Hitch-

cock collection (Ichnology); the Woods collection of Geology; collections of meteorites and minerals; the Audubon collection of birds; the Adams collection in zoology; the Mather collection of casts of sculpture; the exceptionally full lecture room and laboratory apparatus in physics; the Pratt gymnasium, the fine Pratt athletic field, and the Pratt health cottage are among the notable features of the College. The American system of college gymnastic work had its origin at Amherst. With steadily increasing equipment, Amherst encourages self-government on the part of the students. Limited numbers, absolutely healthful surroundings and training for citizenship mark the course. The presidents have been: Zephaniah Swift Moore, D.D., 1821-23; Heman Humphrey, D.D., 1823-45; Edward Hitchcock, D.D., LL.D., 1845-54; William A. Stearns, D.D., LL.D., 1854-76; Julius H. Seelye, D.D., LL.D., 1876-90; Merrill Edwards Gates, PH.D., LL.D., LL.H.D., 1890.

AMICE, or **AMICT**, a vestment in the Roman Catholic service worn during mass. It is a square linen cloth laid over the neck and shoulders, originally a protection for the throat, but adopted as an emblem of the cloth wherewith the Saviour was blindfolded before his crucifixion. In ancient Rome, the A. was an upper garment worn over the tunic.

AMICIS, EDMONDO DE, Italian writer, born at Oneglia, Oct. 21st, 1846. He studied at Corni and Turin, and in 1863 entered the military college of Modena. He took part in the expedition against the brigands in Sicily, and in the war against Austria in 1866. In 1867 he accepted the management of the periodical *L'Italia Militare*, and wrote a series of short stories under the title *La Vita Militare: Bozzetti*, which was well received. His principal books, several of which have been translated into other languages, are: *Novelle* (1872); *La Spagna* (1873); *Ricordi di Londra and Olanda* (1874); *Marocco* (1876); *Ricordi di Parigi* (1878), and *Poesie and Ritratti Letterari* (1881).

AM'IDAS, PHILIP, 1550-1618; an English explorer. He commanded one of the two ships sent by Queen Elizabeth under Arthur Barlow to N. America, coasting up from Florida, and July 13, 1584, entering Ocracoke inlet, North Carolina, of which country he gave a most favorable description. The queen called the new land "Virginia."

AMIDES are a group of organic compounds, derived, under certain conditions, from ammonia, NH_3 , or NHHH , by the exchange of one or more atoms of hydrogen for a corresponding number of atoms of a metal, or a compound radical. The first of these compounds that was discovered was that in which *one* atom of hydrogen was replaced by one of potassium (NHHK , or NH_2K), the resulting product being regarded as a compound of NH_2 (*amidogen*) with potassium, and being termed amide of potassium. At present, the term *amide* is restricted to the case in which one or more atoms of hydrogen are replaced by an *acid* radical, and the amides are called primary, secondary, or tertiary, according as one, two, or all three of the atoms of hydrogen are replaced by the acid radical. The primary amides may be obtained in various ways, of which we shall mention two: (1.) If we heat an ammoniacal salt, one atom of water is given off, and the amide corresponding to the acid is left; thus, acetate of ammonia ($\text{CH}_3\cdot\text{COONH}_4$) - water (H_2O) = acetamide, $\text{CH}_3\cdot\text{CONH}_2$, which, expressed typically, is

$\begin{array}{c} \text{H} \\ \text{H} \end{array} \left\{ \begin{array}{l} \text{N, where } \text{C}_2\text{H}_3\text{O} \text{ is the radical of acetic acid.} \\ \text{H} \end{array} \right.$ (2.) If an anhydride is submitted

to the action of ammonia, there are simultaneously formed an amide and an ammoniacal salt. Thus, valerianic or valeric anhydride ($\text{C}_5\text{H}_9\text{O}$) $_2$ + ammonia (NH_3) $_2$ = valerate of ammonia ($\text{NH}_4\text{O}\cdot\text{C}_5\text{H}_9\text{O}$) + valeramide, $\left\{ \text{C}_5\text{H}_9(\text{NH}_2)\text{O} \right\}$, which, expressed typically, is

$\begin{array}{c} \text{H} \\ \text{H} \end{array} \left\{ \begin{array}{l} \text{N, where } \text{C}_5\text{H}_9\text{O} \text{ is the acid radical of valeric acid.} \\ \text{H} \end{array} \right.$ The amides are, for the

most part, capable of being obtained in a crystalline form, and are fusible volatile bodies. For a description of the more complicated forms of amides, and for a history of their general properties, the reader is referred to the article "Amides" in Watts's *Dictionary of Chemistry*, and to the chapter on Amides in the 2d edition (1867) of Naquet's *Principes de Chimie*, vol. ii. pp. 344-368. If, in place of an *acid radical*, a *base radical* replaces one or more atoms of hydrogen in ammonia, a class of compounds, termed *amines*, is formed, whose composition is noticed in the article **ORGANIC BASES**.

AMYDOGEN, or **DIAMIDE**, NH_2-NH_2 , is a gas, possessing (when concentrated) a peculiar odor somewhat similar to that of ammonia, and when inhaled it strongly affects the nose and fauces. It possesses an alkaline reaction, and unites with acids to form salts. Research shows that its formula must be NH_2-NH_2 , and not NH_2 . See **ALKALOIDS**.

AMIEL, HENRI FRÉDÉRIC, 1821-81; Swiss author, and, after 1849, professor in the university of Geneva, first of æsthetics and French literature, later of moral philosophy. He published a few essays and some volumes of poems, but his reputation rests chiefly on his *Journal Intime*, a posthumous work, full of passion, originality, powerful thought, and masterly description. It was translated into English by Mrs. Humphry Ward in 1889.

AMIENS, an ancient c. in the plain of Picardy, and capital of the department of Somme; it is the seat of a bishop and of a court of justice, and has a citadel and fortifications. It possesses a college, an academy, a theological seminary, an industrial school, a school of medicine, a public library, a picture-gallery, a botanical garden, and several

literary and scientific institutions. Among its public building., the cathedral is a noble edifice, built in 1220, and esteemed a masterpiece of Gothic architecture. Peter the Hermit was born here. A. has considerable manufactures of velvet, silk, woolen, and cotton goods, ribbons, and carpets. But the place owes its celebrity chiefly to the "Peace of A.," a treaty signed in this city, Mar. 27, 1802, by Joseph Bonaparte, the marquis of Cornwallis, Azara, and Schimmelpennink, and intended to settle the disputed points between England, France, Spain, and Holland. By this treaty, England retained possession of Ceylon and Trinidad, and an open port at the cape of Good Hope; France received back her colonies; the republic of the Seven islands was recognized; Malta was restored to the order of the knights of St. John; Spain and Holland regained their colonies, with the exception of Trinidad and Ceylon; the French were to quit Rome, Naples, and Elba; and Turkey was restored to its integrity. These terms were not received with satisfaction by the English, and war was declared against Bonaparte in 1803. In the Franco-Prussian war of '70, A. was taken by the German general Manteuffel, an event which contributed to the fall of Paris. Pop. '86, 80,288; '91, 83,654.

AMIOT, or **AMYOT**, JOSEPH, 1718-94; a Jesuit missionary in China who resided in Peking 43 years, spending the time in the study of the Chinese and Tartar literature, and doing more than all men before had done to acquaint Europe with the knowledge and thought of the Mongolians. Many of his statements were erroneous, but his *Tatar-Manichou-French Dictionary* was a valuable work. He also wrote a full, and, in the main, an accurate *Life of Confucius*, and many essays on Chinese history and science.

AMITE, a co. in s.w. Mississippi, named from Amite river, flowing through it; pop. '90, 18,198, inclu. colored. It formerly had 700 sq.m., but has been reduced to form the co. of Lincoln. Its surface is uneven; soil fertile; corn, sweet potatoes, rice, and cotton are produced. Co. seat, Liberty.

AMLETH, or **HAMLETH**, Prince of Jütland, is said to have lived in the 2d c. b.c. According to Saxo-Grammaticus, he was the son of Horvendill and Gerutha; and after the murder of his father by his uncle Fengo, who married Gerutha, he feigned himself a fool to save his own life. Saxo relates a number of little things regarding A., which are a curious medley of sharp and lively observation, and apparent madness. We are told that, on one occasion, when he visited his mother, suspecting that he was watched, he commenced to crow like a cock and dance idiotically about the apartment, until he discovered, hidden in a heap of straw, a spy, in the person of one of Fengo's courtiers, whom he immediately stabbed; he then so terrified his mother by his reproaches, that she promised to aid him in his intended revenge on his father's murderer, and, according to the old chronicler, really did so. Scandinavian traditions confirm the existence of a prince of this name. A field is still pointed out in Jütland with a tomb bearing the name of A. In the vicinity of Elsinore is shown the spot where the father of A. was assassinated. Saxo himself does not mention the manner or circumstances of his death; but his French translator says that he was murdered at a banquet. Most of the recent historians of Denmark consider the history of A. fabulous, but Müller thinks there is a substratum of fact in the old myth. It is the source of Shakespeare's tragedy of *Hamlet*, and thus possesses a perennial interest for all the civilized world.

AMLWCH, a t. of Anglesey, N. Wales, on the n. coast of the island, 14 m. n.w. from Beaumaris. It stands on a rising ground close to the sea, and consists of one principal street, with diverging streets and lanes. It is a busy but rather dirty t., deriving its importance and wealth almost entirely from the rich copper mines in its vicinity—the mines of the Parys mountain. Copper-smelting is carried on in A., and contributes not a little to make the t. unpleasant. A harbor has been formed by excavation out of the solid slate rock, at the expense of the mining companies, and is capable of receiving vessels of 600 tons burden. It is protected by a breakwater. A branch of the Chester and Holyhead railway terminates at Amlwch. Till 1885 A. was associated with Beaumaris, Holyhead, and Llangefni, in returning one member to Parliament. Pop. about 4500.

AMMAN, or **AMMON**, ancient Rabbah, the chief t. of the Ammonites; a ruined city of Syria, in the pashalic of Damascus, 55 m. n.e. of Jerusalem, on a branch of the Jordan. It was captured by king David; afterwards ruined, but rebuilt by Ptolemy Philadelphus and named Philadelphia. As late as 300 A.D., it was prosperous, and had temples and a fine theater. See Revelations, iii. 7.

AMMAN, JOHANN CONRAD, 1669-1725; a Swiss physician, and one of the earliest writers on the instruction of the deaf and dumb. He graduated at Basel, but fled to Amsterdam on account of his religious views. In his work *Surdus Loquens*, which Haller calls *vere aureum*, he describes the process employed by him in teaching, which was principally by fixing the attention of the pupils on the motions of his lips and larynx while he spoke, and inducing them to imitate until they could utter distinct letters and words.

AMMAN, JOST, 1539-91; a Swiss artist of singular productiveness, many of whose works are in the Berlin collection of engravings. He began a series of copperplate portraits of the kings of France, and made many wood-cuts for the Bible. His drawing is correct and spirited, and his costumes are minutely accurate.

AMMANA' TE, BARTOLOMEO, architect and sculptor, b. at Florence in 1511, d. in 1592. He was at first a pupil of Baccio Bandinelli, and afterwards of Sansovino at Venice. In 1550 he married Laura Battiferri of Urbino, a lady celebrated for her poetical gifts. Pope Julius III. employed him in the decoration of the capitol, and Cosmo de Medici appointed him his architect. His principal works are, the statues which adorn the tomb of Sannazer at Naples, the tomb of Cardinal de Monti at Rome, the bridge of the Trinity and several fountains at Florence. He also completed the Pitti Palace, commenced by Brunelleschi, and ornamented the court with three orders of columns, which were subsequently imitated by J. de Brosse in the Palace of the Luxembourg at Paris. In the collection of architectural designs in the Florence gallery, there is one by A., exhibiting the plans of different buildings, by which a city may be rendered at once magnificent and convenient. His works have all a certain grandeur of character, derived, probably, from his early admiration of Michael Angelo, but are somewhat marred by a quaint mannerism. His bronzes are executed with great delicacy.

AMMEN, DANIEL, naval officer, b. Ohio, 1820; entered the U. S. navy in 1836, and rose to the rank of commodore in 1872. He commanded the gunboat *Seneca*, bore a conspicuous part in the battle of Port Royal, Nov. 7, 1861, and was engaged in all the operations of Admiral Dupont on the s. Atlantic coast; he was in the attack of the ironclads on Fort Sumter, April 7, 1863; was in both attacks on Fort Fisher, and was recommended for promotion by Rear-Admiral Porter; became rear-admiral in 1877, and retired in 1878. He designed a ram vessel for the navy, and published, in 1891, *The Old Navy and the New*.

AMMERGAU MYSTERY. See OBER-AMMERGAU.

AMMIANUS MARCELLINUS, a Roman historian of the 4th c., was present in several campaigns in Gaul, Germany, and the e., and afterwards lived at Rome, devoted to literature. Though a Greek by birth, he wrote in Latin a history of the Roman empire from 91 to 378 A.D., in 31 books, of which 13, containing the years from 91 to 353, are lost. This work, which commenced with the accession of Nerva, may be regarded as a continuation of Tacitus, and though the portions remaining have many faults of style, they are valuable on account of the author's love of truth, his careful descriptions of countries and events from personal observation, and especially his remarks on Germany. After his time, Latin ceased to be employed by any Roman writer in the composition of secular history. The best edition of Ammianus Marcellinus is that by Gardthausen, 1875.

AMMIRA'TO, SCIPIO, 1531-1600; an Italian historian. He entered the church, and was in the service of Pius IV., at the suggestion of duke Cosmo I. He wrote a *History of Florence*, histories of great families in Naples and Florence, and discourses upon Tacitus.

AM'MON, an Egyptian deity, styled Amun on hieroglyphic monuments, was compared by the Greeks with their supreme deity Zeus. The sacred name of Thebes, A.'s city ("*No-Ammon*") in the Old Testament, was therefore translated into Greek by Diospolis. In the temples of this town, his peculiar residence, A. is represented as sitting on a throne, holding the symbols of life and power, and wearing a crown with a peculiar ornament of two feathers, and a band falling behind and hanging down to his feet. He was especially the god of Thebes; though his temples are found in other places, as at Meroë, and over the whole of Nubia and Libya. The name Amun signifies the hidden, unrevealed deity, and, in Egyptian mythology, he held the highest place. His undefined character may serve to explain how other deities were identified with A. After the 18th dynasty, we find in hieroglyphics the name Amun-Ra frequently inscribed, indicating a blending of A. with the sun-god Ra. Similarly, the representation of A. with a ram's head shows the blending of him with Kneph. The worship of A. spread at an early period to Greece, and afterwards to Rome, where he was identified with Zeus and Jupiter. Temples for his worship were erected in Thebes (Bœotia), Sparta, Megalopolis, and other places.

AMMON, CHRIS. FRED., a German theologian, b. Jan. 16, 1766, d. May 21, 1850, is chiefly known by his work on the *Development of Christianity as a Universal Religion* (4 vols., Leip. 1833-40), in which he argues in favor of such liberal development of doctrine as may keep theology in harmony with the progress of science. A. was a leader of the rationalist school. He was a man of extensive learning, united with great industry and earnestness, and was generally respected in Saxony, where he resided.—His second son, FREDERICK AUGUSTUS A. (b. 1799, d. 1861), is well known in Germany as the writer of several works on practical medicine and surgery.

AMMO'NIA, HARTSHORN, or the volatile alkali, was one of the few substances known to the chemistry of the ancients; being referred to by Pliny under the name of *vehement odor*, which he evolved by mixing lime with nitrum (probably sal ammoniac). It derives its name A. from its being obtained from sal ammoniac, which was first procured by heating camels' dung in Libya, near the temple of Jupiter Ammon. The atmosphere contains a minute quantity of A., amounting to 210-247 parts in 10,000,000,000 parts of air, which is equal to 1 volume of A. in 28,000,000 of air. It is likewise present in rain-water in variable proportion. The supply of A. to the atmosphere is its evolution during the outrefaction of animal and vegetable substances, during the vinous fermentation, and the combustion of coal. It is likewise present in respired air, and is therefore a product

of the daily wear and tear of the animal system. The principal source of A. at the present time is the destructive distillation of coal, as in gas-making. The materials which pass over from the retort are partly uncondensable and truly gaseous, and these are carried to our gas-jets and burned; but in other parts they are condensable, and are received during the purification of the gas, as a mixed tarry and watery liquid. On allowing this liquid to settle, the water portion, containing A., can be separated, and, hydrochloric acid being added to it, there is formed a compound of A. and hydrochloric acid, called chloride of ammonium, which can be obtained dry, by evaporating the solution down in shallow vessels. Pure A. is manufactured from this impure chloride of ammonium by mixing it with its own weight of slaked lime in a retort, and applying a gentle heat, when the A. as a gas passes over, and is received in a vessel containing water. The solubility of A. in water is very great, 1 volume of water at 32° F. (0° C.) dissolving 1050 volumes of ammoniacal gas, increasing in bulk, and forming a liquid (*liquor ammoniac* of the chemist, or *hartshorn*), which is lighter than water, its density being 0.891. The solution of A. is transparent, colorless, and strongly alkaline. In taste it is acrid caustic, and in odor very pungent. Applied to the skin in a concentrated form, it blisters. Exposed to the air, the A. escapes, the solution gets weaker, and, reduced to -40° F. (-40° C.), it freezes. As generally obtained, even in the gaseous condition, it is in combination with water, and contains one of nitrogen, 3 hydrogen, and 1 of water, $\text{NH}_3\text{H}_2\text{O}$. Dry A. can be procured by passing the vapor of A., as ordinarily obtained, over fused chloride of calcium, when the water is abstracted, and true gaseous A. is left, having the composition 1 nitrogen, and 3 hydrogen, NH_3 . Gaseous A. can be liquefied under pressure and cold, and then yields a colorless, clear, mobile liquid, with the characteristic odor and other properties of A. much intensified. A. combines with acids to form a class of salts which are of considerable importance. Thus, the crystallized sulphate of A., $(\text{NH}_4)_2\text{SO}_4$, is very extensively used as a top-dressing by farmers, and is also mixed with manures where an increase of ammoniacal matter is desirable. The chloride of ammonium is also employed in agriculture; likewise largely by the Russian peasantry, as a condiment for flavoring food in place of common salt.

In medicine, the gaseous A. has been rarely used. The solution of A. is employed as a means of rousing the respiratory and vascular systems; and of the speedy alleviation of spasm. It is also used as a local irritant and antacid. It is serviceable in dyspeptic complaints with preternatural acidity of stomach and flatulence; to produce local irritation or destruction of certain parts, and to render comparatively harmless the bites of serpents.

AMMONIACUM, or **AMMONIAC**, a gum resin, used in medicine on account of its stimulant and discutient qualities, is obtained from *dorema* A., a plant of the natural order *umbelliferae*, a native of Persia—a perennial, about 7 ft. high, with large doubly pinnate leaves. The leaves are about 2 ft. long. The whole plant is abundantly pervaded by a milky juice, which oozes out upon the slightest puncture, and which hardens, and becomes A. The A. exudes from punctures made by an insect, which appears in great numbers at the time when the plant has attained perfection. Much of it is sent to India, and it is generally imported into Britain from Bombay, although sometimes from the Levant. It occurs in commerce either in tears, or in masses formed of them, but mixed with impurities. It is whitish, becoming yellow by exposure to the atmosphere, is softened by the heat of the hand, and has a peculiar heavy unpleasant smell, and a nauseous taste, at first mucilaginous and bitter, afterwards acrid. It is not fusible, but burns with white crepitating flame, little smoke, and strong smell.—It was for some time erroneously supposed to be the produce of a species of *heracleum*, the seeds of which were found inclosed in it.—A similar substance is obtained from *ferula tingitana*, an umbelliferous plant, growing on light sandy soils in the n. of Africa; and is said also to be obtained from *F. orientalis*, a native of Asia Minor and of Greece. Both these plants have branched stems, and very compound leaves, somewhat resembling fennel. It would seem that the A. of the ancients was the gum resin of the *ferula*, which has a more faint odor and less powerful medicinal properties than that of the *dorema*.

AMMONIAPHONE is the name of an instrument invented by Dr. Carter Moffat, about the year 1880, for the purpose of improving the quality of the singing and speaking voice. Dr. Moffat holds that the air of Italy contains peroxide of hydrogen and free ammonia, and that the excellence of Italian vocal organs is largely due thereto. The ammoniaphone is an apparatus for inhaling air saturated with those gases. It is said that in the year 1884 the ammoniaphone was used by 30,000 persons, including many eminent public singers.

AMMONITES, a Semitic race of people, living on the edge of the Syrian desert; the descendants of Ben-Ammi, the son of Lot (Gen. xix. 38). They inhabited the country lying to the n. of Moab, between the rivers Arnon and Jabbok, i.e. the desert country e. of Gad. Their chief city was Rabbath-Ammon, to which the Greeks afterwards gave the name of Philadelphia. The Israelites were often at war with them and their other Bedouin confederates. Jephthah defeated them with great slaughter. They were also overcome by Saul, David, Uziah, and Jotham; but after the fall of the kingdom of Israel (720 B.C.), spread themselves in the districts of Judea on the e. of the Jordan. In 582 they were subdued by the Babylonians. After the captivity, they recommenced

their feuds with the Jews, but were conquered by Judas Maccabæus. The intermarriages of Jews with the A., which had been frequent, were prohibited by Nehemiah. The chief deity worshiped by the A. was named Milcom, who in his character seems to have resembled Moloch. Justin Martyr affirms that in his time the A. were still numerous.

AMMONITES, a genus of fossil shells, nearly allied to the recent genus *nautilus*, being, like it, chambered and spiral. The molluscous inhabitant appears to have lodged in the last and largest chamber of the shell, the spaces left behind as it increased in size being successively converted into air-chambers, and all connected by a tube (*siphuncle*), so that the animal could at pleasure ascend or descend in the sea; whilst the transverse plates dividing the chambers gave strength to the whole structure without great increase of weight. A. have long been popularly called *cornua ammonis*, from a fancied resemblance to the horns on sculptured heads of Jupiter Ammon. They are found throughout the entire series of fossiliferous rocks from the transition strata to the chalk. They abound in the cretaceous and oolitic groups. Particular kinds distinguish particular formations, a circumstance which renders them of particular interest and importance to the geologist. The number of species is very great, considerably above 200; and several genera have been constituted, as *vacuolites*, *hamites*, *scaphites*, *turritiles*, forming with *ammonites*, the family of *ammonitide*. A. are of very different sizes, from a very small size, to 2, or even 3 or 4 ft. in diameter. The larger ones were in former times ignorantly mistaken for petrified snakes; and impositions have been practised upon collectors by adding to specimens nicely carved snakes' heads; whilst the general absence of the heads was popularly accounted for by a legend of a saint decapitating the snakes, and turning them into stone. See illus., OOLITE GROUP, vol. X.

AMMONIUM, a hypothetical metal, which is said to consist of 1 volume of nitrogen with 4 of hydrogen. It has never been produced in an isolated state; but a singular amalgam of A. and mercury may be formed, by subjecting a globule of mercury, surrounded by a little water of ammonia, to the action of the galvanic current; when the galvanic agency ceases, this amalgam is decomposed into mercury, ammonia, and water. A. may likewise be prepared by acting on an amalgam of sodium and mercury with a solution of chloride of A. A portion of mercury is slightly heated in a porcelain vessel, and pieces of sodium introduced, when the sodium and mercury combine, and form an amalgam of sodium and mercury, which is a semi-solid substance, and scarcely occupies more space than the bulk of the mercury employed. If this be introduced into a vessel containing a strong or saturated solution of chloride of A., NH_4Cl , the chlorine combines with the sodium, Na, of the amalgam, forming chloride of sodium, NaCl , and the A. unites with the mercury, forming the amalgam of A. and mercury. As the change referred to proceeds, the amalgam increases in size many times, and forms a spongy mass of the consistence of butter, which rises through the saline solution and floats on the surface. The amalgam of A. and mercury very readily decomposes into mercury, ammonia, and hydrogen, hence the difficulty of determining its exact composition.

AMMONIUM, now known as the oasis of Siwah, in the Libyan desert, was in ancient times celebrated on account of the oracle of Ammon, the unfortunate expedition of Cambyzes, and the subsequent journeys of Alexander the Great and Cato.

AMMONIUS SACCAS, a Greek philosopher, founder of the Neoplatonic school, is said to have been in his early days a porter in Alexandria. His parents were Christian, but he himself is said to have abandoned his early religion, in which he had been instructed by Clemens Alexandrinus, and to have devoted himself to the study of heathen philosophy under Athenagoras; although both Eusebius and St. Jerome deny that he ever formally apostatized from the Christian faith. His great endeavor was to harmonize, through a comprehensive eclecticism, the various philosophical theories which prevailed in the Roman world, especially those of Aristotle and Plato. He also labored to amalgamate with these the doctrines of the Magi and Brahmans; but instead of boldly announcing the result as his own, he claimed for his system the highest antiquity. His most distinguished pupils were Longinus, Herennius, Origen, and Plotinus, the last of whom, by far the most subtle and profound of the Neoplatonists, always expressed the highest respect for his master. A. died at Alexandria, 243 A.D. He left no writings behind him.

A. is the name of several learned men in the later periods of Greek history; such as A., the master of Plutarch, who lived during the reign of the emperor Adrian, and, like A. Saccas, taught a species of eclecticism in philosophy; A., the Christian philosopher of the 3d c., who wrote a *Harmony of the Gospels*; A., son of Hermeas, a peripatetic philosopher of the 5th c., and disciple of Proclus; A., the famous surgeon of Alexandria, who lived in the time of Ptolemy Philadelphus; and A., the grammarian, who was at first high-priest in an Egyptian temple, sacred to the god Apis, and afterwards (389 A.D.) became teacher at Constantinople, where he had the church historian Socrates for his pupil.

AMMONOOSUC, UPPER and LOWER; small tributaries of the Connecticut river in New Hampshire; the former entirely in Coos co., the latter rising in that co. and running through Grafton, emptying opposite Wells river, Vt. Length, 100 miles. A branch is called the Wild A.

AMMOPHILA, a genus of grasses, closely allied to *arundo* (see REED), and distinguished by a spike-like panicle, and by the *glumes* being nearly equal, keeled, longer than

the *paleæ* of the single floret, and surrounded at the base by a tuft of hairs.—*A. arundo-nacea*, formerly called *arundo arcuaria*—a grass about 2 to 3 ft. high, with rigid bluish leaves, the edges of which are rolled in, and very creeping roots—is frequent on the sandy sea-shores of Britain and the continent of Europe. It is sometimes called SEA REED or SAND REED, and sometimes MAT GRASS, the culms being wrought into foot-mats, coverings for stairs, etc., in the manufacture of which many families residing along the coast of Ireland are employed most of the year. It is also called *marum*, *marrum*, or *marram*, by which name it is designated in laws both English and Scottish, by which the destruction of it was prohibited under severe penalties, because of its great utility in fixing the shifting sand. In Holland and in Norfolk, it is extensively employed—along with the sea lyme grass (q.v.)—in preserving the banks of sand which prevent the inroads of the sea. It is of little value as food for cattle, although they eat the very young leaves. The fiber has been used instead of flax, but is too short.

AMMUNITION is the name given to projectiles, powder, cartridges, fuses, and so forth, and a supply for immediate use is kept in magazines in the forts, or on ship-board, as the case may be. The army has several depots for the storage of powder, the chief of which is about four miles from Dover, N. J. The powder for both branches of the service is supplied by private firms; but must conform to certain requirements which are rigidly applied. For the military service the granulated powder is tested for the uniformity and roundness of the grains, and for its density, strength, and freedom from dust. The powder for naval use is stored in the magazines that have been especially built in the various harbors for the purpose. Where naval magazines are not available the ammunition is stored in the nearest fort. Shot and shell for the older rifled guns and the smooth bores are piled about the various forts and naval stations, except in the case of loaded shell, which are kept in the magazines. Gun-cotton, which has thus far been made chiefly for naval use, is manufactured at the naval torpedo station at Newport, R. I., and all over and above the amount required for immediate use is kept stored in a magazine that has been especially fitted up on one of the other islands in that harbor. The small-arm ammunition is made at the Frankford arsenal, near Philadelphia, in large quantities, chiefly for army use; that for the navy is generally purchased from private makers. At Watertown arsenal a large number of projectiles have been made for army use, and at the Watervliet arsenal at West Troy there is a very extensive plant for the manufacture of projectiles.

The projectiles for the naval guns are made at the naval arsenal at Washington, D. C. The armor-piercing shell are carefully machined and tempered, and are much more expensive to make than projectiles for ordinary use. The ammunition for the rapid-fire and machine-guns is made by contract with private parties. The question of keeping up the supply of ammunition for troops actively engaged is one of the important questions of the day, and is becoming more and more serious, as the introduction of improved weapons makes it possible to expend a greater quantity of ammunition in a given space of time. It has been calculated that an army of 60,000 men, comprising a fair average of infantry, cavalry, engineers, and artillery, ought to be provided with no less than 18,000,000 ball-cartridges alone for six months' operations. To move this supply all at once it would require 1000 wagons and 3600 horses. It is therefore deemed better that, under any such circumstances, there should be established entrepôts for supplying the troops from time to time. The quantity required to be carried with an army of the size above given is 2,680,000 cartridges, besides those in reserve; and for moving this amount 150 wagons, 850 men, and 704 horses would be necessary. In the field an infantry soldier carries from 60 to 100 rounds, the number possible to carry having been considerably increased since smaller calibres have been introduced. Fixed ammunition is the term applied to cases where the powder and projectile are enclosed together, and can be fed to the gun in one motion.

The chief kinds of A. will be found briefly described under their proper headings.

AM-NE'-SIA (Gk., *a*, neg., *mnêsis*, memory), loss of memory.

AM-NESTY signifies an act of pardon or oblivion, and the effect of it is that the crimes and offenses against the state, specified in the act, are so obliterated that they can never again be charged against the guilty parties. The A. may be either absolute or qualified with exceptions. Instances of the latter are to be found in ancient and modern history: Thus, Thrasybulus, when he overthrew the oligarchy in Athens, caused an A. to be proclaimed, from the operation of which the thirty tyrants, who had formed the oligarchy, and some few persons who had acted under them, were excluded. Again, Bonaparte, on his return from Elba in 1815, issued a decree, which was published at Lyons, declaring an A., from the benefits of which he excepted thirteen persons whom he named.

In the absence of specific statutes on the subject, the exercise of A. in the United States was assumed to lie with the president. Washington, without participation by congress, granted A., or pardon, to persons who took part in the "whisky rebellion." John Adams proclaimed full pardon of those engaged in the house-tax insurrection, and Madison did the same in the case of the Baratania pirates. During the civil war, Lincoln and Johnson issued four or five proclamations of A., one of

the latest being so broad in its conditions that it raised in congress the question whether the president had the right to such action, and the judiciary committee of the senate, in Feb., 1869, decided that he had not. "A." is so closely connected with "pardon" and "reprieve" that it is difficult to distinguish them. In one message Pres. Lincoln asserted his exclusive authority under the constitution, and his independence of congress in respect to the pardoning power, even more emphatically than in the proclamation. In 1862 congress had passed an act giving full power to the president, but he considered the act unnecessary, claiming that the constitution gave him the necessary authority. Then, in 1867, the act of 1862 was repealed; and all A. proceedings were remanded to their original basis in the second article of the constitution, until further defined in later amendments. The supreme court had decided in the case of Garland that for pardon the president's power was perfect; yet that is not held to include general amnesty. But in 1868 the fourteenth amendment to the constitution, prohibiting "rebels" from holding certain offices unless their disabilities should first "be removed by a vote of two thirds of each house," seemed to diminish the range of executive authority. Still, the supreme court has held in several cases to the absolute power of the president to grant amnesty and pardon, and that neither congress nor any authority less than an express change of the federal constitution can reverse, abridge, or direct that power. The court, through Chief-justice Chase, says: "It is the intention of the constitution that each of the great co-ordinate departments of the government, the legislative, the executive, and the judicial, shall be in its sphere independent of the others. To the executive alone is intrusted the power of pardon, and it is granted without limit. Pardon includes amnesty. It blots out the offense pardoned, and removes all its penal consequences."

AMNION is the membrane which immediately invests the embryo, appearing very early in the development of the latter, and adhering closely to it. As gestation proceeds, this membrane secretes from its inner surface a fluid which separates it from the fœtus. This fluid, the liquor amnii, consists of water, with albumen, salt of soda, and extractive matters in solution; it has a specific gravity of 1008. It supplies nutriment to the fœtus, preserves around it an agreeable temperature, and when gestation is completed, by projecting the membrane through the os uteri, is the primary agent in opening the way for the fœtus. At this time the A. is thin and transparent, slightly flocculent on the side next its enveloping membrane, the chorion, but smooth on the surface next the fœtus. Within it, the latter is suspended in the fluid, which not only serves the purposes just mentioned, but protects it from injury. For further particulars, see EMBRYO, and for many curious superstitions connected with the subject, see CAUL.

AMCEBA (Gr. "change"), a name given to a number of the simplest animals or protozoa (q.v.), which consist of unit masses of living matter (see CELLS). They are found in fresh water or in mud, and occasionally in damp earth (*A. terricola*). One of the commonest was first described in 1755 by an early microscopist, Rüssel von Rosenhof, and the name he gave it—*proteus animalcule*—still survives in popular language. They are all minute, but some are distinctly visible with the unaided eye. The naked mass of living matter or protoplasm flows out in all directions in blunt processes:—*pseudopodia*—"false feet." Many unit masses or cells of higher animals—e.g., the white corpuscles of the blood—exhibit the same ceaseless change of form, which is generally described as amœboid. The outer layer of the protoplasm is usually firmer than the interior. The central portion contains the more refractive body or nucleus, more than one of which is often present. As the result of internal changes, granules and globules appear in the protoplasm, and 2 pulsating bubbles or *contractile vacuoles* are usually to be seen, which doubtless secure to some extent the aeration and purification of the protoplasm. A passage from an active to an encysted state is common, and on attaining its maximum size, the A. breaks into 2 amœbæ, each of which contains half of the mother nucleus. In a closely allied giant form, *pelomyxa*, a number of spore-like young are formed within the parent. Two amœbæ sometimes flow together and fuse in a manner which may be fairly regarded as an incipient form of sexual union. See Leidy, *Fresh-Water Rhizopods of North America*; Brown's *Protozoa*. For type, see illustration INVERTEBRATES, vol. VIII., fig. 2.

AMCEBAN VERSES, such as answer one another alternately, as in some of Virgil's eclogues.

AMOL, a town of Persia, 76 m. n.e. of Teheran, on the Heraz, an affluent of the Caspian. It has good bazaars, is prosperous and wealthy, and has a winter pop. of 10,000.

AMOMUM, a genus of Zingiberacæ, to which belong the plants yielding cardamoms (q.v.), and grains of Paradise (q.v.).

AMONTONS, GUILLAUME, 1663-1705, a French philosopher, who became an inventor of various mechanical appliances. He was made a member of the Paris acad. of sciences, and in France is considered the inventor of the telegraph. Almost at the same time with Halley, in England, he found that the boiling point of water varies with the elevation.

AMOO'R, or **AMUR**, a river formed by the junction (about lat. 53° n., and long. 120° e.) of the Shilka and the Argoun, which both come from the s.w.—the former rising in Russian Siberia, near the head-waters of the Yenisei; and the latter in Chinese Tartary, not far from the sandy plateau of Kobi. From this starting post, the A. presents, on its right, a tolerably symmetrical curve, which, after receiving, at its most southerly point, the Songari from beyond the wall of China, besides other considerable feeders on both sides of either segment, enters, on nearly its original parallel, the gulf of Saghalien, about a degree below the sea of Okhotsk, properly so called. Above the river Usuri its course marks the boundary between Siberia and Manchuria. It has been ascertained that its basin comprehends about 787,000 sq. m., and that its course has a length of about 2700 miles, starting from the Onon. Steamboats of light draught ascend it as high as Ust Strelka, at the junction of the Shilka; and that river is navigable for boats to the foot of the Yablonoi range in eastern Siberia, part of which lies in the basin of the A. The Russians, after conquering Siberia in the 16th c., turned their attention immediately to the advantages which the possession of this river offered. The territory and the people had always been in the possession of China, the people sometimes tributaries, at other times conquerors. From as early as 1636, Russian adventurers made excursions into the Chinese territories of the lower A. In 1666, they built a fort at Albazin, and succeeded in navigating from that fort to the mouth of the river. In 1685, the fort was taken and destroyed by the Chinese, but was retaken promptly by the Russians, who, however, abandoned it and the whole of the A. to the Chinese. But Russian writers did not cease to keep alive in the minds of their fellow-subjects that the lower A. belonged to them; and the fur-hunters of Siberia, encouraged by government, continued to pursue their vocation on Chinese ground. In 1854-56, two military expeditions were conducted by Count Muravieff, who twice descended the A. from the mouth of the Shilka, unopposed by the Chinese. This was during the Crimean war. On the arrival of news of peace, the Russians were left to strengthen their positions at the mouth and other parts of the A. In 1857 Count Putiatin endeavored in vain to obtain from China concessions on the river in favor of Russia. In 1858, the war between the former country and Great Britain and France induced China to agree to the treaty of Tientsin, by which the boundaries of Russia and China were defined. Several towns were, as the result, established by the former of these two powers on the left bank of the A., of which the largest are Khabarooka and Sofzensk; and an A. trading company was established. In 1860, after the occupation of Pekin by the British and French, in less than a month after Lord Elgin and Baron Gros had affixed their signatures to the peace conventions at Pekin, Gen. Ignatieff secured the signature of Prince Kung to a treaty, by which Russia acquired the broad and wide territory comprised between the river A. and the mouth of the Tumèn, extending 10° of lat. nearer the temperate regions, and running from the shore of the north Pacific eastward to the banks of the river Usuri, a principal affluent of the A. An enormous advantage to Russia of this acquisition of territory was the fact that it conferred on that country the advantage of harbors on the Pacific in a comparatively temperate latitude, where navigation is impeded by ice for at most 3 or 4 months a year. The bay of Passiet, to the s. of this region, lying at a point where the Russian, Chinese, and Corean frontiers adjoin each other, possesses a large trading town and a military station; 60 or 70 m. n. is situated the important harbor of Vladivostok ("rule of the east"), or port May, which, in 1872, was placed in telegraphic communication with Europe by the China submarine cable, and is now the capital of the A. provinces. The island of Saghalien (q.v.), lying immediately n. of the Japan group, along a portion of the coast of Asiatic Russia, and formerly possessed partly by that government and partly by Japan, was recently taken entire possession of by the unscrupulous aggressive power which has so stealthily and silently acquired the adjacent A. provinces.

AMORET'TI, CARLO, 1741-1816; an Italian author. He joined the order of St. Augustine, and was professor of common law in the university of Parma. In 1772, he entered the ranks of the secular clergy. He was curator of the Ambrosian library in Milan, 1797, and the first to give the world knowledge of its treasures, from which he published a collection of voyages. He wrote a life of Leonardo da Vinci, and treatises on natural science, familiarizing Italians with the scientific status of other nations.

AMORET'TI, MARIA PELLEGRINA, 1756-87; niece of Carlo A. At the age of 16 she argued in public on scientific topics, and afterwards studied law, graduating from the university of Pavia. She wrote a treatise on Roman law.

AMORITES, a powerful nation of Canaan, extending on both sides of the Jordan. They were vanquished by the Hebrews under Moses, and their lands beyond Jordan were distributed among the tribes of Gad, Reuben, and Manasseh. Their two most famous kings were Sihon, king of Heshbon, and Og, king of Bashan. Og was the last of the giants, or at least of that gigantic race, the Rephaim. In Deut. iii. 11, his iron bedstead is mentioned as measuring 13½ ft. in length; but the whole of this verse, with the exception of the first clause, is considered by some an interpolation. The Rabbins hold this bedstead to have been Og's cradle, and affirm that his full-grown stature was 120 ft.! Joshua subdued, but did not wholly exterminate, the Amorites in Canaan. The residue of this people became tributary under Solomon. (Gen. x. 15-20; xv. 19-21; Numb. xiii. 29; xxi. 13; Deut. xx. 17; Joshua, ix.)

AMORO'SO, in music, affectionately, tenderly.

AMORPHA. See **INDIGO**.

AMORPHOPHAL'LUS. See **ARUM**.

AMORPHOUS (Gr., *a*, priv., *morphē*, form), shapeless. In chemistry, the term **A.** is used to describe the uncrystallized, in opposition to the crystallized, condition of bodies. There are substances which, in certain conditions, are capable of crystallization, but in other conditions remain **A.** Thus, pure sugar contains carbon, which appears as an **A.** substance after the sugar has been burned in a platina crucible. The same substance, carbon, appears in its crystallized form in the diamond.

AMOS, the Hebrew prophet, was a herdsman of Tekoa, in the neighborhood of Beth-lehem, and also a dresser of sycamore trees. During the reigns of Uzziah in Judah, and Jeroboam in Israel (about 784 B. C.), he came forward to denounce the idolatry then prevalent. His prophetic writings contain, in the first six chapters, denunciations of the divine displeasure against several states, particularly that of Israel, on account of the worship of idols. The three remaining chapters contain his symbolical visions of the approaching overthrow of the kingdom of Israel, and lastly a promise of restoration. The style of **A.**, remarkable for its clearness and picturesque vigor, abounds with images taken from rural and pastoral life. The canonicity of the book of **Amos** is well attested both by Jewish and Christian authorities.

A MOS, BOOK OF, has a place among the writings of the prophets, undisputed by the Jews, and twice affirmed in the New Testament. It is not made up of detached predictions, but is logically and artistically connected in its several parts, and is evidently the mature production of the single author whose name it bears. Nothing is certainly known concerning him besides what he relates of himself—that he was of Tekoa, in Judea, a herdsman and cultivator of sycamore fruit, until the Lord called him away from these employments to prophesy unto Israel. Jerome, applying to him words which Paul used concerning himself, calls him “rude in speech, yet not in knowledge.” Some modern critics have adopted this view, but Bishop Lowth, with good reason, rejects it; thinking “that the shepherd seer is not at all inferior among the prophets. As in sublimity and magnificence he is almost equal to the greatest, so in splendor and elegance of diction he is scarcely below any.” **A.** prophesied during the reigns of Jeroboam II., king of Israel, and Uzziah, king of Judah, two years before the earthquake which Zechariah, 300 years afterwards, mentions as having caused great alarm among the people. The prophecy of **A.** preceded Isaiah's, to which, and to those of the prophets generally, it serves, in some degree, as an introduction, uttering briefly many predictions which they give more at length. Before his time Israel and Judah had been greatly oppressed by the surrounding nations; but having been relieved, they were then, like their neighbors, living in idolatry, luxury, avarice, and cruelty to the poor. Therefore **A.** was commanded to denounce judgments against them all. His prophecy has been compared to a thunder-storm, rolling over the surrounding kingdoms, touching Judah in its progress, pouring the fullness of its power on Israel, and passing away with a bright rainbow on its cloud. The book is accordingly divided into three parts. I. *Judgments against the neighboring nations.* (Chapters i. 3–15; ii. 1–3.) 1. *Syria*; the fulfillment of which, more than half a century after the prediction, is recorded (II. Kings, xvi. 9). 2. *Philistia*; fulfilled (II. Kings, xviii. 8) a century after. 3. *Tyre*; the fulfillment of which was commenced by Nebuchadnezzar, and continued at intervals, until comparatively modern times. 4. *Edom*; the fulfillment of which, in a great measure delayed until the Mohammedan invasion, was soon after that complete. 5. *Ammon*; the destruction of whose great city, Rabbah, is especially foretold. This city, after it had experienced varied fortunes, the Moslems found in ruins, still remarkable, even in the east, for their extent and desolation. 6. *Moab*; of which the palaces of Kirioth are specified as doomed to be destroyed. Of this city, as one of many, modern travelers say, “The ruins are of great extent, with traces of many public buildings, broken columns, private dwellings having low roofs, colossal walls, and massive stone doors. Over these and all the surrounding plains desolation reigns supreme.” II. *Judgments against Judah and Israel.* (Chapters ii. 4; ix. 10); 1. *Judah* (ii. 4, 5); fulfilled, first, by Nebuchadnezzar, about 200 years after the prediction; and, finally, by the Romans, nearly 700 years later still. 2. *Israel* (ii. 6; ix. 10); (1) General reproof for their aggravated sins against God, ii. 6–16. (2) Judgments denounced and the causes of them declared, iii. (3) Remonstrance, five times repeated, against their disregard of former visitations, iv. (4) Lamentation over their approaching ruin, with an earnest exhortation, five times repeated, to seek the Lord that they might even yet be saved, v. 1–24. (5) In view of their continued transgression, notwithstanding the divine forbearance and care, their captivity and inevitable destruction are declared, with the exception, explicitly pledged, that the judgments shall be ended, v. 27; ix. 8–10. III. *The coming of the Messiah is promised, with the admission of the Gentiles to his kingdom, and the final restoration of Israel*, ix. 11–15.

AMOSKEAG. See **MANCHESTER, N. H.**

AMOY, a seaport t. of China, in a small island of the same name, in the province of Fu-kien, on the sea-coast, lat. 24° 10' n. long. 118° e. It is an important commercial

emporium of the east, and contains a population estimated at 100,000. It is divided into an outer and inner t., and has an outer and inner harbor, the entrance to the former of which, as well as the inner t. itself, is fortified. A. has been celebrated as a trading t. for more than a thousand years, and was one of the earliest seats of European commerce in China. The Portuguese had establishments here in the 16th and the Dutch in the 17th centuries. In 1841 it was taken by the British; by the treaty of Nankin, a British consul and British subjects were permitted to reside there. The trade is now open to all nations. The chief imports are rice, cotton-twist, British long cloths, beans, peas, etc.; the exports are tea, sugar, paper, grass-cloths, gold-leaf, etc. The value of its foreign trade is very great. Smuggling is carried on extensively. A. was pillaged by the Tae-ping rebels.

AMPELOP'SIS, a genus of vine-like woody plants, including Virginia creeper, or American woodbine, which is better adapted than ivy to our climate, and more rapid in growth. In autumn the dying leaves are of most brilliant red and yellow. Order, *vitacea*. The vine incorrectly called "Japanese ivy" belongs to this genus.

AMPÈRE, **ANDRÉ MARIE**, a distinguished mathematician and naturalist, was b. at Lyons, Jan. 20, 1775. The death of his father, who fell under the guillotine in 1793, made a deep and melancholy impression on the mind of young A., who sought for solace in the study of nature and antiquity. In 1805, after he had been engaged for some time as private mathematical tutor at Lyons, he was called to Paris, where he distinguished himself as an able teacher in the Polytechnic School, and began his career as an author by his essay on the mathematical theory of chances (*Sur la Théorie Mathématique du Jeu*). In 1814 he was elected as a member of the Academy of Sciences; and in 1824 was appointed as professor of experimental physics in the collège de France. He d. June 10, 1836. Scientific progress is largely indebted to A., especially for his electro-dynamic theory and his original views of the identity of electricity and magnetism, as given in his *Recueil d'Observations Electro-dynamiques* (Paris, 1822), and his *Théorie des Phénomènes Electro-dynamiques* (Paris, 1830). These researches prepared the way for the experiments of Dr. Faraday. Several of A.'s writings may be found in the *Annales de Physique et de Chimie*. The *ampère* or unit of the strength of the electrical current is named after him.

AMPÈRE, **JEAN JACQUES ANTOINE**, son of the above-named, professor of modern literature in the Collège de France, at Paris, and member of the French Academy, was b. at Lyons, Aug. 12, 1800. He acquired a brilliant reputation on account of the keen and searching character of his manifold literary efforts. After laying the groundwork of his comprehensive studies in Paris, he proceeded to Italy, Germany, and Scandinavia. In 1829, when he returned from his travels, he saw no prospect of becoming a professor in Paris, and so consented to give a course of lectures on the history of literature at Marseilles. After the July revolution, he succeeded Andrieux as professor in the collège de France, and also took the place of Villemain in the normal school. In both chairs he taught with great success. He was especially versed in the knowledge of German literature; while his valuable writings upon China, Persia, India, Egypt, and Nubia, as well as his Levantine voyages, proved that the far east itself was embraced within the circle of his studies. A. allowed many of his linguistic and historico-literary investigations to see the light first in reviews, especially the *Revue des Deux Mondes*. In 1833, he published an essay on the relations of French literature to that of other countries in the middle ages; in 1841, an *Essay on the Formation of the French Language*—a most valuable contribution to philology in general; and in 1850, a work entitled *Greece, Rome, and Dante*, which shows his acquaintance with classical and south-European literature. Many of his papers for periodicals have been collected under the title *Littérature et Voyages* (2 vols., Paris, 1834). Deep research and judicious criticism, expressed in a clear and classical style, distinguish his various compositions. He d. March 27, 1864.

AMPERE. See **ELECTRICITY**.

AMPHIARA'US, a legendary son of Oicles and Hypermnestra, known as a prophet, and famed for valor in the Argonautic expedition and the Calydonian hunt, especially renowned in the war of the Seven against Thebes, into which he was forced by the treachery of his wife, a sister of Adrastus, the king of Sicyon who planned the war to restore Polynices to the Theban throne. A. lost his life; but he was deified, and believed to give oracles. Festivals were made in his honor. The ruins of a temple to A. still exist in the ancient Oropia.

AMPHIBIA, in the Linnæan system of zoology, a class containing reptiles and cartilaginous fishes. The term *amphibious* (Gr., having a double life) had been previously employed, as it still popularly is, to denote animals capable of sustaining existence for a considerable time either on dry land or in water. Of the animals of the Linnæan class, however, some only are capable of this, whilst some are strictly limited to the one element, and some to the other, and only a very few are truly amphibious, or adapted by the possession of lungs and gills at the same time for breathing either in air or in water. The Linnæan classification was soon altered by the removal of the cartilaginous fishes from the class amphibia, and the name was retained for a class consisting of reptiles alone—the *reptilia* of Cuvier. See **REPTILES**. In more recent times, however, it is used in a sense equivalent to *Batrachia*, including the toads, frogs, newts, etc. These are more

properly amphibious in the original sense of the term, because they hatch from eggs laid in the water, and while in the larval state have gills like fish and breathe water. Yet many of the *Batrachia* proper are confined to the water during their whole lives, never undergoing the metamorphosis which enables the others to breathe air. In this work the characteristics of the A. in the narrower sense are discussed under the head *BATRACHIA*.

AMPHICTYONIC COUNCIL. This central politico-religious court of several Grecian tribes was held twice a year. In spring, the members assembled in the temple of Apollo, at Delphi; in autumn, in the temple of Ceres, at the village of Anthela, near Thermopylæ. Their purpose was twofold: 1. To determine questions of international law; 2. To preserve the religious institutions of the Greeks. As there were many amphictyonies in the early days of Greek history—of which, however, by far the most important was that which forms the subject of our article—it has generally been supposed that they originated out of a desire for social union, and were, consequently, a result of the national instinct for civilization. Like the Olympic games of a later period, their tendency was to develop a spirit of brotherhood where it was greatly required. The restless Greek intellect, in its application to political life, had naturally an excessive and perilous love of individualism, out of which rose the numerous strifes and animosities of the various states. These councils, on the other hand, were calculated to exert a wholesome centralizing influence. They knit together, for a time, the distracted tribes in a bond of common interest and piety. Like the Olympic games, too, they became the occasion of vast gatherings of the Greek peoples, who crowded thither for every variety of purpose, sacred and secular; and thus a feeling of unity and pure national patriotism was, temporarily at least, excited in the popular mind. The special origin of the A. C. or league is unknown, though we know that it was composed of twelve tribes. The ancient writers differ in the names of these; but the list given by the orator Æschines, though containing only eleven, is perhaps the safest to adhere to: the Thessalians, Bœotians, Dorians, Ionians, Perrhæbians, Magnetes, Locrians, Eteæans, Phthiots, Malians, and Phocians. Probably the remaining tribe was the Dolopians, who are mentioned in other accounts. It has been justly concluded that the great preponderance of the northern tribes, who were of the old Pelasgic race, proves the antiquity of the council. It must have been older than the descent of the Dorians upon the Peloponnesus, or the emigration of the Ionians to the coasts of Asia Minor. Each of the twelve tribes sent to the A. C. two members. These 24 representatives possessed equal authority, although some of the tribes were very small, and hardly independent. They bound themselves by an oath that “they would destroy no city of the Amphictyons, nor cut off their streams in war or peace; and if any should do so, they would march against him and destroy his cities; and should any pillage the property of the god, or be privy to, or plan anything against what was in his temple at Delphi, they would take vengeance on him with hand, and foot, and voice, and all their might” (Æschines). It is only right to state, what indeed most people would naturally conclude for themselves, that so excellent an oath was very indifferently kept. In the primitive period of Greek history, it, in all likelihood, exerted the beneficial and civilizing influence of which we have spoken; but it opposed only a feeble check to the passions and ambition of a more powerful age. The members at times connived and even took part in many political crimes; and thus violated their oath. By the time of Demosthenes, the A. C. had ceased to command respect; in the 2d c. after Christ it still existed, but was then just wavering on the verge of extinction.

AMPHILOCHUS, in legend, a son of Amphiaraus and brother of Alcmaeon; one of the Epigoni in the Seven against Thebes. He was in the Trojan war, and was one of Helen's suitors. With Mopsus he founded Mallus, and when Mopsus refused him a share in the government, the two fought, killing each other. A. was believed to have prophetic power, and had an oracle at Mallus and an altar at Athens, where, with his father, he was worshipped. There are two other mythological persons of the name, one A.'s grandson, the other a son of Dryas.

AMPHION, in mythology, son of Zeus and Antiope, twin brother of Zethus. Both when infants were abandoned on a mountain, but were found and brought up by shepherds. Apollo gave A. a lyre, and he became a singer and musician, his brother being a shepherd and hunter. To avenge their mother's wrongs they captured Thebes, and fortified it by the power of the lyre, to whose music stones moved and fitted into place. A. married Niobe, who bore him many sons and daughters, but all were killed by Apollo. A. killed himself from grief, or was slain by Apollo, for assaulting his temple, and buried with his brother at Thebes. The punishment inflicted by A. upon Dirce for her treatment of his mother (tying her to the tail of a bull and dragging her until she died) is represented in one of the finest works of ancient art—*The Farnese Bull* by Apollonius and Taunicus, found in 1546, and now in the Farnese palace at Rome. There are four other mythical personages named A.

AMPHIOX'US. See *LANCELET*.

AMPHIPOLIS, a city of Macedonia, built on an island at the mouth of the river Strymon, which flowed almost round the t., whence it derived its name (Gr., *amphi*.

around, and *polis*, a city). In ancient times its position must have been invaluable, as it commanded the only safe entrance from the Strymonic gulf into the broad Macedonian plains. It belonged originally to the Edonians, a Thracian people, and was called, on account of the roads which met here, Ennea Hodoi (Nine Ways). The first who attempted to colonize it, Aristagorus of Miletus, was cut off with his followers by the Edonians. The Athenians next tried to gain possession of it. Their first army, amounting to 10,000 men, was utterly cut to pieces at Drabescus, 465 B.C., but their second, 437 B.C., under Agnon, son of Nicias, was successful. The Thracians were expelled, and a new city built, to which Agnon gave the name of A. On account of its situation as an emporium for upper Thrace, and of its neighboring forests of timber for ship-building, A. was an important place. In 424 B.C., it was taken from the Athenians by the Spartan Brasidas, was restored to Athens by the Antalcidean treaty of peace, and afterwards was taken by Philip of Macedon. Under the Romans, it was made the capital of east Macedonia. In the middle ages, it was called Popolia. Its site is now occupied by a Turkish t., but a few of its ruins are still visible.

AMPHISBÆNA, a genus of *lacertilia*, or lizards, of the general appearance of snakes, or worms, found only in the West Indies and South America. The best known is the sooty or dusky species. The body is 18 to 24 in. long, and nearly the same thickness throughout; head small, tail very short. It lives under-ground, feeding on ants and other small insects. As it moves either way with equal ease, rumor gave it two heads, and asserted that when cut in twain the parts would find each other and reunite. Its dried and pulverized flesh was supposed to possess miraculous curative properties. See illus., REPTILES, ETC., vol. XII.

AMPHITHEATER, a spacious building, generally elliptical in form, used by the Romans for exhibiting gladiatorial combats, fights of wild beasts, and other spectacles. The A. differed from a theater for dramatic performances (*theatrum*) in this, that whereas the theater had only a semicircle of seats fronting the stage, the A. was entirely surrounded by them; and hence the name of A. (Gr. *amphi*, "on both sides" or "all round"). Till a late period at Rome, these erections were of wood, and merely temporary, like a modern race-stand. They seem, however, to have been of enormous size, as Tacitus mentions one, during the reign of Tiberius, which gave way, and caused the death or injury of 50,000 spectators. Amphitheaters of stone had begun, however, to be erected at an earlier period than this, the first having been built at the desire of Augustus. The Flavian A. at Rome, known as the Colosseum, which was begun by Vespasian, and finished by Titus 80 A.D., ten years after the destruction of Jerusalem, was probably the largest structure of the kind, and is fortunately also the best preserved. It covers about five acres of ground, and was capable of containing 87,000 persons. Its greatest length is 620 ft., and its greatest breadth 513. On the occasion of its dedication by Titus, 5000 wild beasts were slain in the arena, the games having lasted for nearly 100 days. The exterior is about 160 ft. in height, and consists of three rows of columns, Doric, Ionic, and Corinthian, and, above all, a row of Corinthian pilasters. Between the columns there are arches, which form open galleries throughout the whole building; and between each alternate pilaster of the upper tier there is a window. There were four tiers or stories of seats, corresponding to the four external stories. The first of these is supposed to have contained 24 rows of seats; and the second, 16. These were separated by a lofty wall from the third story, which is supposed to have contained the populace. The *podium* was a kind of covered gallery surrounding the arena, in which the emperor, the senators, and vestal virgins had their seats. The building was covered by a temporary awning or wooden roof, called *velarium*, the mode of adjusting and fastening which has given rise to many antiquarian conjectures. The open space in the center of the A. was called *arena*, the Latin word for sand, because it was covered with sand or sawdust during the performances. The taste for the excitement of the A. which existed in Rome naturally spread to the provinces, and large amphitheaters were erected not only in the provincial towns of Italy, as at Capua, Verona, Pompeii, etc., but at Arles and Nîmes, in France; and even in Gt. Britain, at Cirencester, Silchester, and Dorchester.

AMPHITRITÉ, the daughter of the sea-god Nereus and of Doris—or, according to Apollodorus, of a daughter of Oceanus—was the wife of Neptune. When the latter demanded her in marriage, she fled to Mt. Atlas, but was discovered by a dolphin, which Neptune had sent after her, and borne back to him. As goddess and queen of the sea, she is represented with her husband's trident in her hand, sitting in a car of shells drawn by Tritons, or on a dolphin, before which a Cupid swims.

AMPHITRYON, legendary son of Alcæus and Hipponome. He accidentally killed his uncle Electryon, for which he was expelled from Mycenæ and took refuge in Thebes. There he won the hand of Alcmena, and by her was father of Iphicles. He was killed in a war of Hercules against Erginus. His tomb was extant in Thebes in the days of Pausanias.

AMPHIUMA, a curious genus of *Batrachia*, having an eel-like form, a large head, thick and extensile lips, depressed and rounded snout; the neck contracted, with a transverse fold at the throat; numerous small teeth on the maxillary and palate bones, a single spiracle on each side of the neck; four legs, all very small and two-toed. **A.**

means is found in the southern and south-western parts of the United States. It attains a length of more than 2 ft. and is of a bluish-black color. It lives in muddy water or in mud, burrowing like a worm in the ditches of rice-fields, and feeds on small fish, mollusca, and insects. It is regarded by the negroes as highly venomous, but there is no reason for the notion. See *illus.*, BATS, ETC., vol. II.

AMPHORA, among the Greeks and Romans, was a large vessel, usually made of clay, shaped like our pitchers, with a narrow neck and two handles (hence the name, from Gr. *amphi*, on both sides, and *phero*, to carry), and often ending in a sharp point below, for being inserted in a stand or in the ground. Several of this sort, and in an upright position, were found in the cellars at Pompeii. The A. was chiefly used for the preservation of various liquids, especially wine, the age of which was marked on tickets affixed to the vessel. There is also evidence that amphoræ were employed as cinerary urns and as coffins. The A. among the ancients was likewise a measure for liquids. In Greece, it contained about 9 English gallons. The Roman A. was only two thirds of the Greek A. In modern times, *Anfora* is the name of a wine-measure in Venice.

AMPLIFICATION, i.e., enlargement, a term in Rhetoric, meaning that an idea, an opinion, or an inference is presented to the mind, accompanied by accessory circumstances. Its aim is to produce a powerful and vivid impression through the instrumentality of epithets, particulars, or other methods of elaboration. Rhetorical A. is generally produced—1st, by similitude; 2d, by contrast; 3d, by illustrating the universal in the particular; 4th, by piling up logical arguments. *Exaggeration* is an illegitimate kind of A., being the result of an undue enlargement of particular facts and circumstances.

AMPLITUDE, in astronomy, is the distance of a heavenly body, at the time of its rising or setting, from the e. or the w. point of the horizon. When the sun is in the equator (i. e., at the time of either equinox), he rises exactly e. and sets exactly w., and therefore has no A. His A. is at its maximum at midsummer, and again at midwinter; and that maximum depends upon the latitude of the place, being $23\frac{1}{2}^\circ$ at the equator, and increasing to the arctic circle, where it becomes 90° . The A. of a fixed star remains constant all the year round.

AMPULLA, was a kind of bottle, used by the Romans for the preservation of liquids. It was made either of earthenware or glass, and sometimes, though very rarely, of more costly materials. Great numbers of such vessels have found their way into collections of antiquities. They are generally "bellied," i.e., approaching to globular, narrowing towards the mouth, and provided with two handles. They are frequently mentioned in connection with the baths of ancient times. The *A. olearia* was a "bottle of oil" which the Roman took with him when he went to the bath, and with which he anointed himself after his ablutions. Sometimes the oils were perfumed.

The *A. remensis* (the holy vessel, Fr. *la sainte ampoule*) was the name of that famous vessel in which was contained the unguent (believed to have been brought by a dove from heaven) that anointed Clovis, king of the Franks, at Rheims in 496 A.D., and with which every succeeding monarch of France, down to Louis XVI., was anointed at his coronation. The *A. remensis* was shattered, along with a great many more valuable things, at the revolution of 1789; but a fragment of it was preserved by some devout royalist, and handed over at the restoration to the archbishop of Rheims. Curious to say, a little of the miraculous substance still remained, which was mixed up with oil, and used to anoint Charles X. in 1825.

AMPUTATION (Lat. *amputo*, I lop or prune) is the cutting off of a part which, by its diseased condition, endangers, or may endanger, the safety of the whole body. The A. of a limb was in ancient times attended with great danger of the patient's dying during its performance, as surgeons had no efficient means of restraining the bleeding. They rarely ventured to remove a large portion of a limb, and when they did so, they cut in the gangrened parts, where they knew the vessels would not bleed; the smaller limbs they chopped off with a mallet and chisel; and in both cases had hot irons at hand with which to sear the raw surfaces, boiling oil in which to dip the stump, and various resins, mosses, and fungi, supposed to possess the power of arresting hemorrhage. Some tightly bandaged the limbs they wished to remove, so that they mortified and dropped off; and others amputated with red-hot knives, or knives made of wood or horn dipped in vitriol. The desired power of controlling the hemorrhage was obtained by the invention of the tourniquet (q.v.) in 1674 by a French surgeon, Morell. The ancient surgeons endeavored to save a covering of skin for the stump, by having the skin drawn upwards by an assistant, previously to using the knife. In 1679, Lowdham of Exeter suggested cutting semicircular flaps on one or both sides of a limb, so as to preserve a fleshy cushion to cover the end of the bone. Both these methods are now in use, and are known as the "circular" and the "flap" operations: the latter is most frequently used.

A "flap" amputation is performed thus: The patient being placed in the most convenient position, an assistant compresses the main artery of the limb with his thumb, or a tourniquet is adjusted over it. Another assistant supports the limb. The surgeon with one hand lifts the tissues from the bone, and transfixing them with a long narrow knife, cuts rapidly downwards and towards the surface of the skin, forming a flap; he

then repeats this on the other side of the limb. An assistant now draws up these flaps, and the knife is carried round the bone, dividing any flesh still adhering to it. The surgeon now saws the bone. He then, with a small forceps, seizes the end of the main artery, and drawing it slightly from the tissues, an assistant ties it with a thread. All the vessels being secured, the flaps are stitched together with a needle and thread, and a piece of wet lint is laid over the wound. An expert surgeon can remove a limb thus in from 30 to 60 seconds.

AMRAOTI, a district and city in India. The district has an area of 2566 sq.m., pop. abt. 500,000. It is a plain, about 800 ft. above tide, broken only by a line of hills 400 or 500 ft. higher. There are four considerable towns: the city of A., pop. 23,410; Karinja, 11,750; Badnera, on the great Indian peninsular railway which crosses the district, 6676; and Kolapur, 6169.

AMRITSAR (*Umrītsar*), a city of the Punjab, in n. lat. 31° 40', and e. long. 74° 45', containing (1891) 136,766 inhabitants. It is the religious metropolis, a distinction which, along with its name, it owes to its "pool of immortality," on an islet of which stands the chief temple of the Sikh faith. A. is a favorite haunt of pilgrims; and it was the place where, perhaps to bind the slippery Sikhs more firmly, was signed the treaty of 1816, for ceding to the British the territory between the Beas and the Sutlej. A. is, next to Delhi, the richest and most prosperous city in northern India, being connected with the capital, distant 36 m. to the w., by a canal, possessing considerable manufactures of cotton, silks, shawls, etc., and carrying on considerable trade. A. is on the Scinde, Punjab, and Delhi railway; and is the capital of a district of 1574 sq. m., with a pop. of about 900,000, and of a division with an area of 5354 sq. m., and a pop. of about 2,750,000, both of the same name.

AMRU'-BEN-EL-ASS, or **AMER**, d. 663 A.D., one of Mohammed's disciples, but before conversion a furious opponent. Like Sāul, his change made his zeal greater on the other side, and chiefly to him were the prophet's successors indebted for the conquest of Syria. In 639 he led 4000 men into Egypt, besieged ancient Memphis, took it by storm, and on the spot built Fostat, the ruins of which are now known as old Cairo. In 640, after a siege of 14 months, he took Alexandria, losing 23,000 men. He is credited with projecting a canal to unite the Mediterranean and Red seas. He is charged with causing the destruction of the famous library at Alexandria, but the charge may well be dismissed, as it was not advanced until six centuries after his death. There is reason to believe that no large proportion of the 700,000 volumes left by the Ptolemies remained at the date of A.'s conquest.

AMRU'-EL-KAIS, or **AMROULCAYS**, an Arabian poet, contemporary with and opposed to Mohammed. Before the prophet announced his mission, A. wrote one of the seven poems called "Moallakat" (suspended) because they were suspended in the Kaaba at Mecca. They were put in English by Sir William Jones.

AMSDORF, **NIKOLAUS VON**, 1483-1565; a German Protestant reformer, an early and determined supporter of Luther; educated at Leipsic and first graduate of the new university at Wittenberg; professor of theology in 1511. He was with Luther at the Leipsic conference and the diet of Worms, and in the secret of his Wartburg seclusion. He assisted the first efforts at reformation in Magdeburg, Goslar, and Einbeck. He was active in the Schmalkald debates, and spoke strongly against the bigamy of the elector of Hesse. A. was made a bishop of Naumburg in 1542; resigned in 1547, and took part in founding the university of Jena. He superintended the publication of Luther's works, and opposed Melancthon on the separation of the High-Lutheran party.

AMSLER, **SAMUEL**, professor of the art of engraving on copper, in the academy of arts, Munich, was b. Dec. 17, 1791, at Schinznach, in Switzerland, received his first lessons from Lips of Zurich, and afterwards studied under Hess, in Munich. His first great work was an engraving from a Magdalen by Carlo Dolce. In 1816, he went to Rome, where, in several engravings of statues by Thorwaldsen, he succeeded well in uniting the characteristics of the originals with the simple style of Marcus Antonio. Aided by Barth and Hildburghausen, he engraved a title-page for the *Lay of the Nibelungen*, from a design by Cornelius. During his second sojourn in Rome (1820-1824), he began his great work, an engraving of "Alexander's Triumphal Procession," by Thorwaldsen. At Munich, in 1831, he finished his large plate of the "Burial of Christ," by Raphael, which, with his engraving of a statue of Christ, by Dannecker, displayed the highest qualities of imitative art. These works were followed by a "Holy Family," from Raphael, and the "Madonna di Casa Tempi." His last great work was an engraving from Overbeck's "Triumph of Religion in the Arts." A. d. May 18, 1849. His style is marked by a clear and noble treatment of form, rather than by strong contrast of tones. Few engravers have equaled A. in his deep knowledge and faithful representation of the works of Raphael.

AMSTERDAM, or **AMSTELDAM** (the dam or dike of the Amstel), the chief city of the Netherlands, is situated at the confluence of the Amstel with the IJ (pronounced Eye), an arm of the Zuider Zee, and is divided by the former, and numerous canals, into small islands, connected by about 300 bridges. Almost the whole city, which extends in the

shape of a crescent, is founded on piles. At the beginning of the 13th c. it was merely a fishing-village, with a small castle, the residence of the lords of Amstel. In 1296, on account of the murder of count Floris of Holland, the rising town was demolished, and its inhabitants were compelled to leave it. Afterwards, with Amstelland (the district on the banks of the Amstel), it was taken under the protection of the counts of Holland, and under them enjoyed several privileges which contributed to its subsequent prosperity. In 1482, it was walled and fortified. It soon rose to be the first commercial place in the united states of the Netherlands; in 1585 was considerably enlarged by the building of the new town on the w.; and in 1622 had 100,000 inhabitants. This prosperity excited the envy of its neighbors. In the 17th c., the war with England so far reduced the commerce of A., that, in the year 1653, about 4000 houses were uninhabited. Prosperity was restored during the next century, and, though commerce was again injured by the disputes with England in 1781 and 1782, it once more revived. The union of Holland with France in 1810 entirely destroyed the foreign trade of A., while the excise and other new regulations impoverished its inland resources; but the old firms lived through the time of difficulty, and in 1815 commerce again began to expand.

The city has a fine appearance, when seen from the harbor, or from the high bridge over the Amstel. Numerous church towers and spires relieve the flatness of the prospect. The old ramparts have been levelled, planted with trees, and formed into promenades. Between 1866 and 1876, many spacious streets and an extensive public park were added to the city. Tramways have been successfully introduced, and the harbor greatly improved. There is railway communication with all parts of the country and of Europe. Rich grassy meadows surround the city. On the w. side are a great number of windmills for grinding corn and sawing wood. The three principal canals in A., on each side of which, with a carriage-way and row of trees intervening, the gentlemen's residences are built, run in semicircles within each other, and are from 2 to 3 m. long, called the Heerengracht, Keizer's-gracht, and Prinsengracht. The houses are built of brick, and have their gables toward the streets, which gives them a picturesque appearance. In old times, A. was strongly fortified; but now its only defense consists in the sluices, several miles distant from the city, which can flood, in a few hours, the surrounding land. A hard frost, however, like that of 1794-95, when Pichegru invaded the country, would render this means of defense useless.

The pop., Dec. 31, 1894, amounted to 450,189, the majority belonging to the Dutch reformed church. Of the remainder the most numerous are the Roman Catholics, the Lutherans, Jews, and Baptists. The chief industrial establishments are sugar refineries, engineering works, mills for polishing diamonds and other precious stones, dockyards, manufactories of sails, ropes, tobacco, silks, gold and silver plate and jewelry, colors and chemical preparations, breweries, distilleries, with export houses for corn and colonial produce; cotton-spinning, book-printing, and type-founding are also carried on. The present bank of the Netherlands dates from 1824, Amsterdam's famous bank of 1609 having been dissolved in 1796. There are private banks. The former Stadhuis, converted into a palace for king Louis Bonaparte, and still retained by the reigning family, is a noble structure raised upon 13,659 piles, and extending 290 ft. in length, by 239 ft. in breadth, surmounted by a round tower, rising 190 ft. from the base. It has a hall, 120 ft. long, 57 ft. wide, and 90 ft. high, lined with white Italian marble—an apartment of great splendor.

The *Nieuwe Kerk* (New Church), founded in 1408, is the finest ecclesiastical structure in the city. Its chancel is especially admired. It contains the tombs of Admiral de Ruyter, of the famous Dutch poet Vondel, and of various other notable persons. The Old Church (*Oude Kerk*), built in the 14th c., contains several monuments of naval heroes. Literature, science, and recreation are not forgotten in the pressure of business, for A. has its academy of arts and sciences, an excellent museum of paintings by the old masters and other collections, a library, harmonic societies, a botanical and a zoological garden, and several theaters. The hospital for aged people, the poor-house, house of correction, the orphan asylums, a navigation school, and many benevolent societies, are well supported, and managed on good principles. Large ships reach the city by the North Holland canal (53 m. in length) from Nieuwe Diep, but, if drawing more than 15½ ft. of water, must first discharge a large part of the cargo. To avoid this delay and expense, the IJ has been separated from the Zuider Zee by a sea-dike, with sluices for admitting the small inland ships, and pumping-machinery capable of discharging 2500 cubic meters of water per minute. Two piers have been built into the North sea, near Wijk aan Zee, to form a harbor. The peninsula has been cut by a canal which is continued through the IJ, and capable of admitting vessels drawing 22 ft. direct to A., reducing also the distance from 52 to 15 m., the length of the new canal. In carrying out these works, about 12,000 acres of excellent land have been reclaimed from the IJ, and since 1876 a large tract has been bearing fine crops.

AMSTERDAM, a barren islet in lat. 37° 52' s., and long. 77° 37' e., the home of sea-birds, shell-fish, and seals. It is worthy, however, of notice at once for its structure and its situation. Manifestly of volcanic origin, it still possesses a burning soil and hot springs; and along with its single neighbor, St. Paul, 60 m. to the n.e., it is about midway in the direct line between the cape of Good Hope and Van Diemen's Land, being also at nearly the same distance from cape Comorin.

AMSTERDAM, a city in Montgomery co., N. Y., 33 miles n. w. of Albany, on the Mohawk river, and on the New York Central and Hudson River and West Shore railroads and Erie canal, has factories producing knit goods, wagon springs, silk, paper boxes, etc., and has foundries and machine shops, churches, banks, electric lights, modern water and sewer systems, newspapers, an academy, a hospital, and a board of trade. Pop. 1880, 11,710; 1890, 17,336.

AMUCK, or **AMOOK**, **RUNNING** (Javanese, *amook*, "to kill"), a custom in Java among those in whom a ferocious madness is produced by long use of opium. The sufferer rushes abroad armed with some weapon, usually a creese, or large dirk, striking indiscriminately at all whom he encounters. When one is seen to start on his madness, the people cry "amook," and immediately hunt the maniac to death. Probably in many cases this is deliberate on the victim's part, as a means of suicide. This madness is known only by the Javanese.

AMULET, any object worn as a charm. It is often a stone or piece of metal, with an inscription or some figures engraved on it, and is generally suspended from the neck, and worn as a preservative against sickness, witchcraft, etc. Its origin, like its name, seems to be oriental. The ancient Egyptians had their amulets, sometimes forming necklaces. Among the Greeks, such a protective charm was styled *phylacterion*; among the Romans, *amuletum*. This word is probably derived from the Arabic *hamalet* ("what is suspended"). The phylacteries of the Jews (see Matt. xxiii, 5), slips of parchment on which passages of the law were written, were evidently worn as badges of piety by the Pharisees; but were also regarded as wholesome preservatives from evil spirits, and from all manner of harm. From the heathen, the use of amulets passed into the Christian church, the inscription on them being *ichthus* (the Greek word for a fish), because it contained the initials of the Greek words for Jesus Christ, Son of God, Saviour. See **ABBREVIATIONS**. Among the Gnostic sects, Abraxas stones (q.v.) were much used. Amulets soon became so common among Christians that, in the 4th c., the clergy were interdicted from making and selling them on pain of deprivation of holy orders; and in 721 the wearing of amulets was solemnly condemned by the church. Among the Turks and many other nations of central Asia, every person considers it necessary to wear a preservative charm. With the spread of Arabian astronomy, the astrological A. or talisman (q.v.) of the Arabs found its way to Europe. Kopp, a German author, has written a work, *Palæographica Critica*, on amulets and their inscriptions. Among amulets in repute in the middle ages were the coins attributed to St. Helena, the mother of Constantine. These and other coins marked with a cross were thought specially efficacious against epilepsy, and are generally found perforated, for the purpose of being worn suspended from the neck.—The belief in the virtue of amulets is not extinct among the vulgar.

AMURATH, or **MURAD**, I., 1319–89; Sultan of the Ottoman Turks, succeeding his father Orkhan in 1360. He was the first to lead Turkish arms into Europe, and in 1361 took Adrianople, fixed there his residence, built a splendid mosque, and further adorned the city. Urban V. preached a crusade against him, but the venture was disastrous to the Christians. The Greek emperor John Palæologus was his ally; but the son of the Greek and one of A.'s sons made a conspiracy, which was defeated and young Amurath was put to death by his father. A. was a good soldier but illiterate, signing treaties by dipping his hand in ink and making a mark with three fingers together, with the fourth finger and thumb at distant places. He lost his life in the battle of Cassova, and was succeeded by his son Bajazet.

AMURATH, or **MURAD**, II., about 1403–51; tenth emperor of the Turks, succeeding Mohammed I. in 1421. He took Salonika (Thessalonica) from the Venetians and opened the way for subjugating Greece. He went on successfully till 1442, when he was defeated by Hunniades and obliged to make peace with the Christians. At that time he lost a son, and abdicated in favor of another son, Mohammed, only 14 years of age. The Christians renewed the war, and hastening from retirement he defeated them in the important battle of Varna, Nov. 10, 1444, where Ladislas, king of Hungary, fell. He again retired, and again came forth to quell an insurrection of the janissaries. He invaded Albania and the Peloponnesus, where George Castriot (Scanderbeg) defeated him; but he retreated only to gain a great victory over his former adversary Hunniades, at Cassova, Oct. 17, 1448, in a battle lasting three days. He was the first Ottoman emperor who caused bridges of great length to be built; and in his reign poetry, jurisprudence, and theology began to flourish. He died of apoplexy at Adrianople.

AMURATH, or **MURAD**, III., 1545–95; succeeded his father, Selim II., in 1573 as sultan of the Turks. It is said that his first words to his courtiers at accession were, "I am hungry; give me something to eat," and they were prophetic of the famines and disasters of his reign. In 1579, queen Elizabeth gained his friendship, and made with him a commercial treaty. In his reign the janissaries began to know their power, and to hasten the ruin of the state by revolts. He was superstitious, feeble, irritable, fond of dancing, music, and the pleasures of the harem.

AMURATH, or **MURAD**, IV., about 1611–40; succeeded his uncle Mustapha in 1622. The chief event of his reign was the recovery of Bagdad after 30 days' incessant assault upon the Persian defenders. His bloody character has given him the name of the Turkish

Nero. On repossessing Bagdad he slew 30,000 Persians in cold blood. It is supposed that this ferocity and his early death at the age of 39 were due to perpetual intoxication.

AMURNATH, a cave amidst the mountains which bound Cashmere on the n. e. It is a natural cave in a rock of gypsum, about 30 yards high and twenty yards deep. It is believed by the Hindus to be the residence of the god Siva, and is therefore visited by multitudes of pilgrims. It is inhabited by vast numbers of doves, which fly out in alarm on the loud shouting of prayers by the pilgrims, and this is supposed to indicate the acceptance of their prayers.

AMUSSAT, JEAN ZULÉMA, 1796–1856; a French surgeon. He entered the army, was assistant surgeon under Esquirol in La Salpêtrière Hospital, and prosecutor at the Paris faculty of medicine. He improved and invented many surgical instruments, and was the first to show the importance of torsion of arteries in hemorrhage. He wrote on the nervous system, lithotomy, etc.

AMYCLÆ, an old Laconian t., was situated on the eastern bank of the Eurotas, 2½ miles s.e. of Sparta, in a richly wooded and fertile region. It was a famous city in the heroic age, the abode of Tyndarus and his spouse Leda, who bore to Jupiter the twins, Castor and Pollux (called *Amyclæi fratres*, the Amyclæan brothers), and also Helena. Long after the Dorians had subjugated and peopled the rest of the Peloponnesus, A. continued to be a free Achæan town. It was conquered by the Spartans only before the first Messenian war, and in consequence of a curious and absurd law. The inhabitants were so often agitated by false rumors of the approach of the Spartans, that, growing tired of living in a state of continual alarm, they decreed that no one should henceforth mention or even take notice of these disagreeable fictions. Unfortunately, the Spartans *did* come at length, and according to the Greek saying, "A. perished through silence." Hence the proverb, *Amyclis ipsis taciturnior* (more silent than A. itself). After its conquest, A. became a village, noted only for its annual festival of the Hyacinthia, and its temple of Apollo, with the colossal statue of the god himself.—A., an ancient city on the coast of Campania, Italy, said to have been built by a colony from the Greek A. It had ceased to exist in the time of Pliny.

AMYGDALÆÆ, or **DRUPACÆÆ**, according to some botanists, a natural order of dicotyledonous plants, but more generally regarded as a sub-order of **ROSACEÆÆ**. The species are all trees or shrubs. They have the tube of the calyx lined with a disk, the pistil a solitary simple carpel with a terminal style, the fruit a drupe. For other botanical characters, see **ROSACEÆÆ**. The bark yields gum, and hydrocyanic acid is present in very notable quantity in different parts, as the leaves, kernels, etc. The A. are chiefly natives of the cold and temperate regions of the northern hemisphere. Some of them yield valuable fruits; and various products of the order are used in medicine. See **ALMOND**, **PEACH**, **PLUM**, **CHERRY**, and **CHERRY LAUREL**. This order or sub-order contains about 110 known species.

AMYGDALIN, $C_{20}H_{27}NO_{11}$, $3H_2O$, is a crystalline principle existing in the kernel of bitter almonds, the leaves of the *cerasus lauro-cerasus*, and various other plants, which, by distillation, yield hydrocyanic acid. It is obtained, by extraction with boiling alcohol, from the paste or cake of bitter almonds, which remains after the fixed oil has been separated by pressure. The alcoholic solution usually contains more or less oil, which must be removed by decantation or filtration; it must then be evaporated till a syrup is left, which must be diluted with water, mixed with yeast, and set aside to ferment, in order to get rid of any sugar that may be present: on now filtering and evaporating, the amygdalin crystallizes in thin transparent needle-like prisms. It has a sweetish, somewhat bitter taste, and is not poisonous, and when treated with alkaline solvents, ammonia is expelled, and amygdalic acid, $C_{20}H_{26}O_{13}$, is produced. Its most remarkable change is, however, that which is noticed in the article **ALMONDS**, **VOLATILE OIL OF**, and which may be thus briefly stated. When the bruised almond kernel, or almond paste, is brought in contact with water, the peculiar odor of bitter almonds is almost immediately evolved; and in twenty-four hours all traces of amygdalin will have disappeared, its place being taken by essential oil of almonds, hydrocyanic acid, sugar, and formic acid. This transformation is due to the presence of a peculiar nitrogenous matter called emulsine (q. v.), or synaptase, which sets up a kind of fermentation. As the proportion of hydrocyanic acid which is liberated by the above reaction is fixed, Liebig and Wöhler recommend that amygdalin should be employed in preparing that acid for medicinal purposes. Amygdalin may be dissolved in water for any length of time without undergoing change; but if it be mixed with an emulsion of sweet almonds, immediate decomposition ensues. Seventeen grains of amygdalin, when dissolved in 1 oz. of emulsion of sweet almonds, furnish exactly 1 grain of pure hydrocyanic acid, which may be readily diluted to the strength of the pharmacopœial acid.

AMYGDALOID (from *amygdalus*, an almond), a rock, consisting of a basis of some kind of trap-rock, very frequently of greenstone, forming numerous roundish or oval cells, which are filled with nodules, often of calcareous spar or of zeolitic minerals. The cells are not of large size, but even those which are almost adjacent differ much in this respect. The nodules are evidently the result of a sublimation and imperfect crystallization, under the action of the heat which formed the cells. Empty cells often

occur amongst those which are filled with minerals. The name A. is sometimes extended to rocks of the same character, although the basis be not of trap.

AMYL, C_5H_{11} , is the fifth in the series of alcohol radicals whose general formula is C_nH_{2n+1} , and of which methyl and ethyl are the first two members. It enters into a large number of chemical compounds, most of which—as, for instance, bromide, chloride, iodide, etc.—are derived from amylic alcohol, which bears precisely the same relation to amyl that ordinary alcohol bears to ethyl (C_2H_5). Amylic alcohol is sufficiently described in the article FUSEL OIL, which is the name given to the crude alcohol. The radical A. (C_5H_{11}) has not been prepared in the free state, but a hydrocarbon containing two amyl radicals, diamyl ($C_{10}H_{22}$), is obtained by heating amyl-iodide with an amalgam of zinc in a closed tube at a temperature of about 350° , and is one of the natural products of the distillation of coal. It is a colorless liquid, with a sp. gr. of 0.741 at 32° F. (0° C.), a boiling-point of 311° F. (155° C.), and a somewhat aromatic odor, and it exerts a right-handed rotatory action on a ray of polarized light.

AMYLACEOUS (from *amylum*, starch), a term used in chemistry and botany, and equivalent to starchy.—A. food is food consisting at least in great part of some kind of starch, as arrow-root, sago, etc.—A compound radical, called *amyle*, is formed by the decomposition of starch in a peculiar fermentation—the *amylic fermentation*—but to it the term A. has no reference.

AMYLENE, a thin colorless liquid, boiling at 102° F. (39° C.), density of vapor 2.43; sp. gr. 0.65; discovered in 1844 by Balard. It is produced by treating amylic alcohol with sulphuric or phosphoric acid. It is very volatile, mixes with alcohol and ether, and burns with a white flame; combines actively with bromine, the hydracids, and chloride of sulphur. Its vapor is rapidly absorbed by sulphuric anhydride and perchloride of antimony. It has been used like chloroform as an anæsthetic, but with occasional fatal results.

AMYLIC ALCOHOL. See FUSEL OIL.

AMYL, NITRATE OF, $C_5H_{11}NO_2$, a yellow mobile liquid prepared by the action of nitrous acid on amyl alcohol, or by distilling together potassium nitrate, amyl alcohol, and sulphuric acid. It boils at 210° F. (99° C.), and has a sp. gr. of 0.902. Its vapor explodes if heated much above its boiling-point. The odor of amyl nitrite is similar to that of ethyl nitrite, but more stupefying. Inhaled in small quantity, its vapor produces a sudden quickening of the pulse and a rush of blood to the head. It is said to have been used successfully in the treatment of asthma and epilepsy.

AMYOT, or **AMIOT**, JACQUES, a French writer, well known by his excellent translations of the Greek classics, was b. in 1513, and d. in 1593. Racine highly esteemed the translations by A., of which the version of Plutarch is one of the best, and has passed through several editions.—**AMIOT**, Joseph, a celebrated Jesuit and oriental scholar, was b. at Toulon in 1718, and lived as a missionary in China from 1750 to the time of his death, in 1794. His knowledge of the Chinese and Tatar languages enabled him to collect many valuable notices of antiquities, history, language, and arts, in China. Many of his writings may be found in the *Mémoires concernant l'Histoire, les Sciences et les Arts des Chinois* (15 vols. Paris, 1776–1791). His *Dictionnaire Tatar-Manchou Français* was edited by Langlès in 1789.

AMYRAUT, Moïse, 1596–1664; an eminent French Protestant theologian and metaphysician, of an illustrious family from Alsace. His father set him to study law, and he made rapid progress in the university of Poitiers; but on his way home met at Saumur the Protestant minister, Bonchereau, who took him to Plessis-Mornay, governor of the city, and the two persuaded A. to leave law for theology. He dwelt at Saumur, and “sat at the feet of the great Cameron,” a pupil as great as his master. His fame became such that universities and churches in Saumur, Paris, and Rome competed for his presence. A. referred all to the synod of Anjou, and its decision settled him at Saumur, both as professor and pastor. His co-professors were Louis Capell and Josua de la Place; and their life-long friendship was beautiful and remarkable, as is their memory as joint authors of the *Theses Salmuriensis*. In 1631, A. published *Traité des Religions*, still a living work; and thenceforward he was foremost in provincial and national synods. His character was largely shown when the Charrenton synod of 1661 chose him to present to the king the *Copy of the Complaints and Grievances for the Infractions and Violations of the Edict of Nantes*. Before this time all save Roman Catholic deputies had addressed the king on their knees; but A. refused to speak unless he could stand as did the Romanists, and carried the day, his rehearsal charming even his adversaries. His oration is an historic landmark in French Protestantism. He held fast to Calvinism, but with an unusual liberality. He left many religious works.

AMYRIDACEÆ, a natural order of dicotyledonous or exogenous plants, consisting of trees and shrubs, natives of tropical countries, remarkable for the abundance of their fragrant balsamic or resinous juice. They have compound leaves, occasionally with stipules and pellucid dots. The flowers are in racemes or panicles; the calyx persistent, with 2 to 5 divisions; the petals are 3 to 5; aestivation valvate or imbricated. The stamens are twice or four times as many as the petals. The ovary is superior, sessile, 1 to 5 celled.

inserted in a large disk; the style solitary and compound, or wanting; the stigmas as many as the cells of the ovary; the ovules in pairs, anatropal. The fruit is hard and dry, 1 to 5 celled, its outer rind often splitting into valves. The seeds are exalbuminous. About 40 or 50 species are referred to the order; but many of them are still very imperfectly known. Some species afford valuable timber; but the principal products of the order are fragrant resins and balsams, as Myrrh (q.v.), and different kinds of frankincense (q.v.), olibanum (q.v.), elemi (q.v.), bdellium (q.v.), tacamahac (q.v.), balsam of gilead (q.v.), etc. Among the more important genera of the order may be named *amyris*, *balsamodendron*, *boswellia*, and *icica*. *Canarium commune*, a native of Java, which yields a gum similar in its properties to the balsam of copaiva (q.v.), produces also triangular nuts, which are eaten both raw and dressed, and from which an oil is extracted for the table and for burning. *Balanites egyptiaca* is cultivated in Egypt for its fruit, a drupe, which is eaten, and from the seeds of which a fat oil is expressed, called *zachun*.

ANA, a termination added to the names of remarkable men, to designate collections of their sayings, anecdotes, etc.; as in the works entitled *Baconiana*, *Johnsoniana*. Such titles were first used in France, where they became common after the publication of *Scaligerana* by the brothers Dupuy (Hague, 1666). In English literature there are many works of this kind. America, also, has its *Washingtoniana*. A tolerably complete catalogue of works with such titles may be found in Namur's *Bibliographie des Ouvrages publiés sous le Nom d'Ana* (Brussels, 1839).

ANABAPTISTS, a term applied generally to those Christians who reject infant baptism, and administer the rite only to adults; so that when a new member joins them, he or she is baptized a second time, the first being considered no baptism. The name (Gr. to baptize again) is thus owing to an accidental circumstance, and is disclaimed by the more recent opponents of infant baptism, both on the continent and in Great Britain.

The origin of the sect cannot be distinctly traced; but it is manifestly connected with the controversy about infant baptism carried on in the early church. Opposition to this doctrine was kept alive in the various so-called heretical sects that went by the general name of Cathari (i.e., purists), such as the Waldenses, Albigenses, etc. Shortly after the beginning of the reformation, the opposition to infant baptism appeared anew, especially among a set of fanatical enthusiasts called the prophets of Zwickau, in Saxony, at whose head were Thomas Münzer (q.v.) (1520) and others. Münzer went to Waldshut, on the borders of Switzerland, which soon became a chief seat of anabaptism, and a center whence visionaries and fanatics spread over Switzerland. They pretended to new revelations, dreamed of the establishment of the kingdom of heaven on earth, and summoned princes to join them, on pain of losing their temporal power. They rejected infant baptism, and taught that those who joined them must be baptized anew with the baptism of the Spirit; they also proclaimed the community of goods, and the equality of all Christians. These doctrines naturally fell in with and supported the "peasant war" (q.v.) that had about that time (1525) broken out from real causes of oppression. The sect spread rapidly through Westphalia, Holstein, and the Netherlands, in spite of the severest persecutions. The battle of Frankenhausen (see MÜNZER) crushed their progress in Saxony and Franconia. Still, scattered adherents of the doctrines continued, and were again brought together in various places by traveling preachers. In this capacity, one Melchior Hoffmann, a furrier of Swabia, distinguished himself, who appeared as a visionary preacher in Kiel in 1527, and in Emden in 1528. In the last town he installed a baker, John Matthiesen, of Haarlem, as bishop, and then went to Strasburg, where he died in prison. Matthiesen began to send out apostles of the new doctrine. Two of these went to Münster, where they found fanatical coadjutors in the Protestant minister Rothmann, and the burghers Knipperdolling and Krechting, and were shortly joined by the tailor Bockhold, of Leyden, and Gerrit Kippenbrock, of Amsterdam, a bookbinder, and at last by Matthiesen himself. With their adherents, they soon made themselves masters of the city; Matthiesen set up as a prophet, and when he lost his life in a sally against the bishop of Münster, who was besieging the town, Bockhold and Knipperdolling took his place. The churches were now destroyed, and 12 judges were appointed over the tribes, as among the Israelites; and Bockhold (1534) had himself crowned king of the "New Sion," under the name of John of Leyden. The Anabaptist madness in Münster now went beyond all bounds. The city became the scene of the wildest licentiousness; until several Protestant princes, uniting with the bishop, took the city, and by executing the leaders, put an end to the new kingdom (1535).

But the principles disseminated by the A. were not so easily crushed. As early as 1533 the adherents of the sect had been driven from Emden, and taken refuge in the Netherlands; and in Amsterdam the doctrine took root and spread. Bockhold also had sent out apostles, some of whom had given up the wild fanaticism of their master; they let alone the community of goods and women, and taught the other doctrines of the A., and the establishment of a new kingdom of pure Christians. They grounded their doctrines chiefly on the Apocalypse. One of the most distinguished of this class was David Joris, a glass-painter of Delft (1501-1556). Joris united liberalism with anabaptism, devoted himself to mystic theology, and sought to effect a union of parties. He

acquired many adherents, who studied his book of miracles (*Wunderbuch*), which appeared at Deventer in 1542, and looked upon him as a sort of new Messiah. Being persecuted, he withdrew from his party, lived inoffensively at Basle, under the name of John of Bruges, and died there in the communion of the reformed church. It was only in 1559 that his heretical doctrines came to light, when the council of Basle had the bones of Joris dug up, and burned under the gallows.

The rude and fanatical period of the history of anabaptism closes with the scandal of Münster. A new era begins with Menno Simons. (See MENNO.) Surrounded by dangers, Menno succeeded, by prudent zeal, in collecting the scattered adherents of the sect, and in founding congregations in the Netherlands, and in various parts of Germany. He called the members of the community "God's congregation, poor, unarmed Christians, brothers;" later, they took the name of Mennonites, and at present they call themselves, in Germany, *Taufgesinnte*; in Holland, *Doopsgezinden*—corresponding very nearly to the English designation Baptists. This, besides being a more appropriate designation, avoids offensive association with the early Anabaptists. Menno expounded his principles in his *Fundamentbuche von dem rechten Christlichen Glauben*, 1556 (Elements of the True Christian Faith). This book is still an authority among the body, who lay particular stress on receiving the doctrines of the scripture with simple faith, and acting strictly up to them, and set no value on learning and the scientific elaboration of doctrines. They reject the taking of oaths, war, every kind of revenge, divorce (except for adultery), infant baptism, and the undertaking of the office of magistrate; magistracy they hold to be an institution necessary for the present, but foreign to the kingdom of Christ; the church is the community of the saints, which must be kept pure by strict discipline. With regard to grace, they profess universalism, or hold it to be designed for all, and their views of the Lord's supper fall in with those of Zwingli; in its celebration, the rite of feet-washing is retained. In Germany, Switzerland, and Alsace, their form of worship differs little from the Lutheran. Their bishops, elders, and teachers serve gratis. Children receive their name at birth, baptism is performed in the place of worship, and adults that join the sect are rebaptized.

But along with these general principles there have been endless diversities and splits in the sect, occasioned by differences as to strictness of discipline. This cause divided the body, as early as 1554, into the mild and the strict Mennonites. The first are known by the title of Waterländers, from a place in Holland; the second split again into a multitude of subdivisions, according to minute shades of strictness, and their several designations, derived from the names of leaders, places, and even peculiarities of dress (John-Jacob Christians, Buttoners, Hook-and-eye-ers, etc.), bewilder the student of ecclesiastical history. The purity of their lives, however, commanded everywhere respect, and their industry made them prosperous; so that they gradually secured formal toleration in many places.

Almost the only split among the early continental Baptists on doctrinal grounds was that which took place in Amsterdam in 1664. Arminianism had not been without its influence, especially among the Waterländers, originally more liberal in their views. A leading congregation accordingly divided into two parties, one (Galenists, from Galenus, their leader) advocating freer views in doctrine and discipline; the other (Apostoolists, from Samuel Apostool) adhering to absolute predestination and the discipline of Menno. The liberal party rejected creeds as of human invention, adopted much of the philosophy and theology of England, and exercised no little influence on the intellectual progress of Holland. These two parties gradually absorbed the other sections of the Baptists in the Netherlands; and about the beginning of the 19th c., a union took place by which all the congregations now belong to one body.

In Germany, the Baptists have made some attempts in more recent times to extend their church with considerable success. Under the Baptist Union of Germany (which, although including churches in Holland, Poland, and other countries, derives its strength largely from Prussia) the number of their churches greatly increased. In Prussia, various concessions had been made to the Baptists early in this century, such as exemption from military service. They were tolerated in Bavaria, Baden, Württemberg, Mecklenburg, Russia, France, and Denmark, but were expelled from Sweden. Wherever they are settled, they are respected as quiet, industrious subjects; but several German governments have imposed restrictions on their exercise of public worship; the reason assigned being the tendency to visionary enthusiasm, which had again shown itself in some congregations.

As the representatives of the sect in Great Britain and North America have little or no historical connection with the earlier A. of the continent, they fall more properly to be noticed under BAPTISTS.

ANABASIDÆ, or **ANABANTIDÆ**, a family of acanthopterygious fishes, characterized by a remarkable structure of the upper membranes of the pharynx, which are divided into small irregular leaves, containing between them cellular reservoirs. These retain water sufficient to keep the gills moist for a considerable time, and so enable the fish to subsist out of water, and to travel some distance on dry ground; some of the species, as the climbing perch (q. v.) of India (*anabas scandens*), climbing steep banks, or even trees, by means of the spines of the fins, tail, and gill-covers. *Ophecephalus margini-*

natus is often seen traveling among the grass in the beginning of the rainy season. The fishes of this family appear to leave the water for various reasons; but very commonly, it would appear, upon account of the drying up of pools in periodical droughts, their peculiar organization enabling them to go in search of others. They are all fresh-water fishes, natives of the s.e. of Asia, continent and islands, and of South Africa. The species are numerous, and are arranged under 11 genera. Some of them are much esteemed for their delicacy as food.

ANABASIS (Greek), literally, an ascent or a march out of a lower into a higher country—the name of two historical works: 1. The *A. of Cyrus*, written by Xenophon, which gives a narrative of the unfortunate expedition of the younger Cyrus against his brother, the Persian king Artaxerxes, and of the retreat of his 10,000 Greek allies under the command of Xenophon; 2. The *A. of Alexander*, written by Arrian, and giving an account of the campaigns of Alexander the Great.

ANABOLISM, the constructive processes within the protoplasm, by which food or other material, at a relatively low level, passes through an ascending series of ever more complex and unstable combinations, till it is finally worked up into living matter. See **PHYSIOLOGY** and **CELLS**.

ANABLEPS (from the Gr., *anablepo*, to look up), a genus of fishes of the order *mala-copterygii abdominales*, family *cyprinidæ* of Cuvier—of the family *cyprinodontidæ* (q. v.) of Agassiz—characterized by a structure of the eyes to which there is nothing similar in any other vertebrate animals. This consists in a division of the *cornea* and *iris* into two somewhat unequal elliptical parts, by transverse bands formed of the *conjunctiva* (see **EYE**), so that the animal appears to have four eyes, and there are really two pupils on each side, the other parts of the eye being single. This peculiarity of structure is supposed to be connected with a habit which these fishes are said to have of swimming with the eyes partly out of the water. They are elongated, scaly fishes, with flattish rounded back, and depressed head. The young are brought forth alive, and in a state of considerable advancement. The best known species, *A. tetraphthalmus*, inhabits the rivers of Guiana and Surinam.

ANACARDIACEÆ (TEREBINTACEÆ of some botanists, and part of TEREBINTACEÆ of others), a natural order of dicotyledonous or exogenous plants, consisting of trees and shrubs, which abound in a resinous, sometimes acrid and poisonous juice. The leaves are alternate and without dots; the flowers inconspicuous, usually unisexual. The calyx is generally small and persistent, and has generally five divisions; the petals are perigynous, equal in number to the segments of the calyx, imbricated in æstivation, occasionally wanting. The stamens are equal in number to the petals, and alternate with them, or twice as many, or more; distinct when there is a fleshy disk, cohering at the base when the disk is wanting. The ovary is usually single, free or adhering to the calyx, 1-celled; the styles 1, 3, or 4, occasionally wanting; the ovule solitary, attached to the bottom of the cell by a cord. The fruit is usually a drupe, the seed exalbuminous. The order contains about 95 known species, chiefly but not exclusively tropical, amongst which are a considerable number valuable for the resinous juices and varnishes which they yield, as the varnish of Sylhet, varnish of Martaban, Japan lacker, etc., and others, which produce wholesome and pleasant fruits. See **CASHEW NUT**, **PISTACIA**, **MASTIC**, **MANGO**, **HOG PLUM**.

ANACARDIUM. See **CASHEW NUT**.

ANACHARIS, a genus of plants of the natural order *hydrocharidææ*, of which one species, *A. alsinastrum* (*elodea canadensis* of some botanists), has recently become naturalized in Britain, suddenly appearing in so great abundance as to impede the navigation of some rivers and canals. It is a native of North America, growing in ponds and slow streams and is a dark-green, much-branched perennial, entirely floating under water, its flowers only appearing above water for a very short time at the period of fertilization, as in others of the order to which it belongs. It has numerous leaves, which are either opposite, or in whorls of 3 or 4, without foot-stalks, linear-oblong, transparent, 3 to 4 lines long. The female flowers are sessile in the upper axils, and are inclosed in a small 2-lobed spathe; the slender tube of the perianth is often 2 or 3 in. long, so as to attain the surface of the water, where it terminates in three or six small spreading segments. The male flowers are seldom observed. The plant was first found in Britain in 1842, by the late Dr. Johnston of Berwick, in the lake of Dunse Castle and again in 1847 by Miss Kirby, in the reservoirs of a canal in Leicestershire. It is now very abundant and troublesome in the Trent, Derwent, and other rivers. Its rapidity of growth is extraordinary. Immense masses disfigure the shallows of the Trent, and cover the beds of the deeps. It strikes its shoots under the mud in a lateral direction for 6 in. or 1 ft., and then rises and spreads. The stems are very brittle, and every fragment is capable of growing, so that the means usually adopted to get quit of it serve rather for its propagation. It appears, however, that water-fowl are very fond of it; and by them, probably, its seeds may be conveyed from one river to another. It has been found that swans may be fed upon it with advantage, and its excessive growth kept down more effectually in this way than in any other. It is supposed to be a great impediment to the progress of salmon ascending the rivers in which it occurs; but for some kinds of fish it probably affords both food and shelter. The manner of its introduction into Britain

is unknown, although it has been conjectured that it may have escaped from some garden-pond.

ANACHAR'SIS, a Scythian and brother of king Saulios, visited Athens in the time of Solon, with whom he lived on terms of intimacy, but whose abilities for framing a constitution he does not seem to have estimated highly. Incited by a love of learning, he subsequently traveled through several countries. On account of his clearness of understanding, he was numbered among the seven wise men; and many sagacious proverbs and sayings were ascribed to him. No other "barbarian" ever received the Athenian franchise. The letters which bear his name were written long after his time. It is said that, after his return to his native land, he was put to death by order of the king, who feared the introduction of the mysteries belonging to the Greek religion, in which it was supposed that A. had been initiated.

Under the title, *Voyage du Jeune Anacharsis en Grèce* (Travels of the young Anacharsis in Greece), Jean Jacques Barthélemy, a well-known French author (q.v.), wrote a description of Greek life and manners, displaying learning and good taste, but disfigured by many anachronisms. A. is made to visit Athens only a few years before the birth of Alexander the great, and the features of several distinct periods in Grecian history are confusedly regarded as having been contemporaneous. The book, therefore, will not bear a critical examination; but it has contributed its share towards an improved knowledge of ancient life, and has given rise to several similar works, such as the *Gallus* and *Charicles* of Becker. The A. of Barthélemy has been translated into English, and is to be found in most old libraries; it is still a deservedly esteemed work, which may be read with advantage by the young.

ANACHRONISM, an error in chronology. Sometimes an A. is purposely made for the sake of effect, or to bring certain events within convenient compass for dramatic purposes. Shakespeare, in his *Julius Cæsar*, makes the "clock" strike three; and Schiller, in his *Piccolomini*, speaks of a "lightning-conductor" as existing about 150 years before the date of its invention. These discrepancies, however, do not seriously injure the general truth of a poetical work. The A. is more offensive when, in a work which pedantically adheres to the costumes and other external features of old times, we find a modern style of thought and language, as in the old French dramas of Corneille and Racine. In popular epic poetry A. is a common feature. Achilles is always young; Helena, always beautiful. In their versions of old classic traditions, the writers of the Middle Ages converted Alexander, Æneas, and other ancient heroes, into good Christian knights of the 12th century. In the *Nibelungen-lied*, Attila and Theodoric are good friends and allies, though the latter began to reign some 40 years after the former. At the end of the poem the heroine, who must have been nearly 60 years old, and had passed through great affliction and sorrow, is still the "beautiful Queen Kriemhild."—Many ludicrous examples of A. may be found in old paintings, e.g., Abraham, Isaac, and Jacob in modern costumes.

ANACLA'CHE, one of the mountains of Bolivia, in 18° 12' s., 69° 20' w.; about 4 m. high, always covered with snow.

ANACLE'TUS I., SAINT; second or third bishop of Rome, a martyr under Domitian. Others say that he succeeded Clement I. as fifth Roman bishop, and was martyred about 109 A.D.

ANACLE'TUS II., PETER DE LEON, anti-pope. He was chosen in 1130 by a faction of cardinals opposed to Innocent II., and was sustained by the Roman and some other states. He maintained himself at Rome against the arms of Lothaire, the opposition of other kings, and the clergy in general; d. 1138.

ANACONDA, *Eunectes murina*, a serpent of the boa family, native of tropical America. It passes most of its time in shallow lakes or streams, living chiefly on small rodents, iguanas, fish, and occasionally monkeys and ant-eaters, which it crushes and swallows. It is not venomous, and is handled without danger. The natives, who make shoes and bags of its skin, use its fat for oil, and its flesh for food. It is ovoviviparous; swims rapidly and can remain long under water. It sometimes measures 30 ft. in length.

ANAC'REON, one of the most esteemed lyric poets of Greece, was b. at Teos, a seaport of Ionia, spent part of his youth in Abdera, to which place most of his fellow-townsmen emigrated when the city was taken by the Persians in 540 B.C., and rose to fame as a poet about 530 B.C. He was patronized by Polycrates, the ruler of Samos, who invited him to his court; and there he sang, in light and flowing strains, the praise of wine and beauty. After the death of Polycrates, he went to Athens (521 B.C.), and was received with distinguished honor by Hipparchus. On the fall of Hipparchus, he left Athens, and probably returned to Teos, from which, during the insurrection of Ionia against Darius, he fled to Abdera, where he d., at the age of 85. According to tradition, he was choked by a dried grape. Great honors were paid to him after his death; Teos put his likeness upon its coins, and a statue was raised to him on the Acropolis of Athens, which represented him in a state of vinous hilarity.

Only a few of his poems have been preserved. Of five books which once existed, only 68 lyrics now exist which bear his name; but of these, comparatively few are to be confidently regarded as genuine. They exhibit great simplicity and delicacy of expres-

sion, fertility of invention, and variety of illustration. Moore, a poet of congenial spirit, translated the *Odes* of A. into English verse.

ANACYCLUS. See PELLITORY OF SPAIN.

ANADYOMENE ("emerging"), one of the names of Venus; a painting by Apelles, representing Venus rising from the sea, and wringing her flowing wet hair. Phryne or Pancaste was supposed to have supplied the model for this master-piece of Apelles. The inhabitants of the island of Cos bought the picture, and placed it in the temple of Æsculapius. Augustus afterwards bought it for 100 talents of remitted taxes, and placed it in the temple of Venus Genetrix. It is frequently described in the Greek anthology.

ANADYR', or **ANADIR**, a sea or large gulf of n.e. Asia, much resorted to by whalers. —**ANADYR RIVER**, in e. Siberia, flows 500 m. through rocky, barren, and snowy regions, and empties in the sea of A.

ANÆMIA (from *a*, privative, and *aima*, blood) is the condition generally termed poverty of blood, and consists essentially of a diminution in the fibrine, and especially in the proportion of red corpuscles of the blood (see BLOOD), which in some cases of A. may be so low as 27 in 1000 parts. Persons in an anæmic condition have pale waxy complexions, pallid lips and tongues, and if blood be drawn from them, it forms a clot which is less red, and also smaller in proportion to the serum, than blood from a healthy person.

They suffer from palpitations, fainting, and headaches, singing in the ears, and disturbed vision; and the symptoms may simulate organic disease within the head or of the heart. This A. condition may be induced by repeated losses of blood, or by defective nutrition, or by some cause, as in chlorosis, when the balance is disturbed between the loss and reproduction of the red corpuscles.

The curative treatment of A. consists in allowing the patient fresh air, good nourishment, and those materials which promote the formation of the deficient elements of the vital fluid. Of these, the principal is iron, of which there are several preparations. This remedy has, in some instances of chlorosis, doubled the proportion of red blood corpuscles in a very short time.

ANÆSTHESIA (*a*, privative, and *aisthēsis*, sensation) is a term used to express a loss of sensibility to external impressions, which may involve a part or the whole surface of the body. In some diseased conditions of the nervous centers, a part of the body may become totally insensible to pain, while, in another part, sensation may be unnaturally acute, or be in a state of hyperæsthesia. When a nerve is divided, there is no feeling of touch or pain referred to the parts which it supplies, because these are cut off from communication with the brain; and in some diseases, as the *elephantiasis græcorum*, a loss of sensation in patches of the skin is an early and characteristic symptom. This insensibility to external impressions may be either *peripheral*—that is, on the surface of the body—or *central*, that is, from a cause acting primarily upon the brain or spinal cord. See METHYLENE.

In ancient writers, we read of insensibility or indifference to pain being obtained by means of Indian hemp (*cannabis Indica*), either inhaled or taken into the stomach. The Chinese, more than 1500 years ago, used a preparation of hemp, or *ma-yo*, to annul pain. The Greeks and Romans used mandragora for a similar purpose (*poiein anaisthēsan*); and as late as the 13th c., the vapor from a sponge filled with mandragora, opium, and other sedatives was used. The mandragora, however, occasionally induced convulsions, with other alarming symptoms; and though Bulleyn, an English author (1579), mentions the possibility of putting patients who were to be cut for the stone into "a trance or a deepe terrible dreame" by its use, it gradually became obsolete and banished from the pharmacopœia. John Baptista Porta, of Naples, in his work on natural magic (1597), speaks of a quintessence extracted from medicines by somniferous *menstrua*. This was kept in leaden vessels, perfectly closed, lest the *aura* should escape, for the medicine would vanish away. "When it is used, the cover being removed, it is applied to the nostrils of the sleeper, who draws in the most subtle power of the vapor by smelling, and so blocks up the fortress of the senses, that he is plunged into the most profound sleep, and cannot be roused without the greatest effort. . . . These things are plain to the skillful physician, but unintelligible to the wicked." In 1784, Dr. Moore, of London, used compression on the nerves of a limb requiring amputation, but this method was in itself productive of much pain. In 1800, Sir Humphry Davy, experimenting with the nitrous oxide or laughing-gas, suggested its usefulness as an anæsthetic; and in 1828, Dr. Hickman suggested carbonic acid gas. As early as 1795, Dr. Pearson had used the vapor of sulphuric ether for the relief of spasmodic affections of the respiration. The fact that sulphuric ether could produce insensibility was shown by the American physicians Godwin (1822), Mitchell (1832), Jackson (1833), Wood and Bache (1834); but it was first used to prevent the pain of an operation in 1846, by Dr. Morton, a dentist of Boston. At the request of Dr. John C. Warren, Morton administered ether in an operation at the Mass. General Hospital on Oct. 16, 1846. The fiftieth anniversary of this event was celebrated in Boston on Oct. 16, 1896. In Dec., 1846, Robinson and Liston, in England, operated on patients rendered insensible by the inhalation of sulphuric ether. This

material was extensively used for a year, when Sir J. Y. Simpson, of Edinburgh, discovered the anæsthetic powers of *chloroform* (see CHLOROFORM), and introduced the use of it into his own department, midwifery. Since that time, chloroform has been the anæsthetic in general use in Europe, but ether is preferred in America. It is now the opinion of most medical men, that chloroform should not be given where there is weak action of the heart from disease. Other substances have been used by inhalation, such as nitric ether and bichloride of methylene. The latter substance has been recommended by Dr. Richardson, of London; but it has not been generally accepted, as it depresses to a dangerous extent after it has been administered for some time.

Nothing could be more desirable than the power of producing *local A.* Freezing mixtures have been employed; a stream of carbonic acid or cooled air, or a finely divided spray of ether, have been thrown on the part. All of these methods have the disadvantage that they injure the tissues, and may be followed by much pain. An agent which would numb the sensory nerves, without injuring them or the neighboring parts, is still a great want. Recently, in dentistry, the inhalation of nitrous oxide has been much employed. It is rapid in action, and is not usually followed by unpleasant effects; but as it induces a condition in the blood similar to that in asphyxia, its use is not unattended with danger. Chloroform continues to occupy its high place as one of the greatest blessings granted to man. It is proper, however, to say that it requires to be used under certain precautions, and that in unskillful hands its application may be fatal.

ANAGALLIS. See PIMPERNEL.

ANAGNI is a town in the province of Roma, Italy, situated on a hill thirty-seven miles southeast of Rome. It is an ill-built town, but contains some interesting ruins, also a cathedral of the eleventh century, which has been much modernized. It is the ancient *Anagnia*, at one time the capital of the Hernici, and a place of considerable importance during the whole period of Roman history. Virgil speaks of it as the "wealthy Anagnia." It has also been the birthplace of four popes—Innocent III., Gregory IX., Alexander IV., and Boniface VIII. Population about 9000.

ANAGRAM (from the Greek *ana*, backwards, and *gramma*, writing), the transposition of the letters of a word, phrase, or short sentence, so as to form a new word or sentence. It originally signified a simple reversal of the order of letters, but has long borne the sense in which it is now used. The Cabalists attached great importance to anagrams, believing in some relation of them to the character or destiny of the persons from whose names they were formed. Plato entertained a similar notion, and the later Platonists rivaled the Cabalists in ascribing to them mysterious virtues. Although now classed among follies, or at best among ingenious trifles, anagrams formerly employed the most serious minds, and some of the puritanical writers commended the use of them. Cotton Mather, in his elegy on the death of John Wilson, the first pastor of Boston, in New England, mentions

His care to guide his flock and feed his lambs
By words, works, prayers, psalms, alms, and *anagrams*.

The best anagrams are such as have, in the new order of letters, some signification appropriate to that from which they are formed. It was a great triumph of the mediæval anagrammatist to find in Pilate's question, "*Quid est veritas?*" (What is truth?) its own answer: "*Est vir qui adest*" (It is the man who is here). Anagrams, in the days of their popularity, were much employed, both for complimentary and for satirical purposes; and a little straining was often employed in the omission, addition, or alteration of letters, although, of course, the merit of an A. depended much upon its accuracy.

I. D'Israeli (*Curiosities of Literature*, vol. iii.) has a chapter on anagrams, which, as an exercise of ingenuity, he ranks far above acrostics. Among a great many considered by him worthy of record, are the following: The mistress of Charles IX. of France was named *Marie Touchet*; this became *le charme tout* (I charm every one), "which is historically just." The flatterers of James I. of England proved his right to the British monarchy, as the descendant of the mythical king Arthur, from his name *Charles James Stuart*, which becomes *claims Arthur's seat*. An author, in dedicating a book to the same monarch, finds that in *James Stuart* he has a *just master*. "But, perhaps, the happiest of anagrams was produced on a singular person and occasion. Lady Eleanor Davies, the wife of the celebrated Sir John Davies, the poet, was a very extraordinary character. She was the Cassandra of her age, and several of her predictions warranted her to conceive she was a prophetess. As her prophecies in the troubled times of Charles I. were usually against the government, she was at length brought by them into the court of high commission. The prophetess was not a little mad, and fancied the spirit of Daniel was in her, from an A. she had formed of her name,

ELEANOR DAVIES.
Reveal, O Daniel!

The A. had too much by an *l*, and too little by an *s*; yet *Daniel* and *reveal* were in it, and that was sufficient to satisfy her inspirations. The court attempted to dispossess the spirit from the lady, while the bishops were in vain reasoning the point with her out of the scriptures, to no purpose, she poisoning text against text: one of the deans of the

arches, says Heylin, shot her through and through with an arrow borrowed from her own quiver; he took a pen, and at last hit upon this excellent A. :

DAME ELEANOR DAVIES.
Never so mad a Ladie!

The happy fancy put the solemn court into laughter, and Cassandra into the utmost dejection of spirit. Foiled by her own weapons, her spirit suddenly forsook her; and either she never afterwards ventured on prophesying, or the A. perpetually reminded her bearers of her state—and we hear no more of this prophetess."

On a visit to King's Newton hall, in Derbyshire, Charles II. is said to have left written on one of the windows, *Cras ero lux* (To-morrow I shall be light), which is the A. of *Carolus Rex*.

AN'AEHM, a city of Orange co., Cal., on the Santa Ana river, about 8 m. from the sea. It is situated on branches of the Southern Pacific and the Atchison, Topeka and Santa Fé railroads; 27 m. s.e. of Los Angeles. It is in a beautiful valley and has a genial climate. The town contains churches, large school-buildings, the school of the Dominican Sisters, newspapers, etc. It manufactures wines and brandies, and has a large trade in oranges, lemons, walnuts, and farm and dairy products. The land in the vicinity is irrigated by canals from the Santa Ana river. Pop. 1890, 1273.

ANAHUAC', a Mexican term, said to signify "near the water." Its application is vague in the extreme. It is either a plateau or a ridge. As a ridge again it oscillates between the continuation of the Rocky mountains, below lat. 40° n., and that branch of the chain which runs nearly parallel to the upper course of the Rio Bravo del Norte; and as a plateau, it designates either the whole of the table-land of Mexico or certain portions thereof, more or less extensive, with the capital as a common center. Practically, if one acceptance is more generally admitted than another, A. may be regarded as the largest of those plateaus—a definition which, with reference to the number of lakes, seems more peculiarly to suit the etymology of the word. See further, **CORDILLERAS OF CENTRAL AMERICA**—a description which, for want of a briefer and better one, may be made to embrace all that less regular section of the backbone of America which lies between the simple formations of the Andes to the s. and the Rocky mountains to the n.

AN'AKIM, a gigantic race of people, whose stronghold was Kirjath-arba, in the s. of Palestine. In the opinion of some biblical critics, they were not Canaanites, as they are not included in the list of devoted nations; others, again, conclude from the fact that invariably mention is made only of three individuals or families, that the name is appellative rather than gentile, and that the A. were merely particular tribes of the wide spread and powerful Amorites, distinguished for their unusual stature. The Israelites considered them dangerous for neighbors, and conquered them. It was the A. whose appearance so terrified the Hebrew spies who entered the land of promise from Kadesh-barnea. Those who escaped the sword of Joshua fled to the country of the Philistines; and it has been conjectured that Goliath and the other Philistine giants were their descendants. This is probable, because the particular places in which the fugitive A. took refuge were Gaza, Gath, and Ashdod. The word Anak means a necklace or neck-chain; and some have supposed that these giants received that name from wearing such ornaments proudly round their necks; others translate the word A. by "long-necked men," or men with long-stretched necks, *i.e.*, men of great height. The A., however, in all probability, derived their name from Anak, the son of Arba.

ANAKOLUTHON is a term employed both in grammar and rhetoric, to denote the absence of strict logical sequence in the grammatical construction. Good writers sometimes sacrifice this logical sequence to emphasis, clearness, or graceful arrangement. In colloquial speech, nothing is more common than examples of A.

ANAL'CIME, **CUBICITE**, or **SARCOLITE**, a silicate of alumina and soda, usually occurring in 24-sided crystals, and sometimes in cubes with the eight solid angles replaced by the faces of an octahedron. It is found in the lake Superior copper region.

ANALEM'MA, a name given to a projection of a sphere upon a plane. In this form of projection, called also *orthographic*, the plane of projection is that of a meridian, or one parallel thereto, and the point of sight is assumed at an infinite distance on a line normal to the plane of projection and passing through the center of the sphere. A circle which is parallel to the plane of projection is projected into an equal circle; a circle perpendicular to the plane of projection is projected into a right line equal in length to the diameter of the projected circle; a circle in any other position is projected into an ellipse, whose major axis equals the diameter of the projected circle. The term A. was also applied to an instrument of brass or wood, on which such a projection was accompanied by a horizon; it was used in finding the time of the rising or setting of the sun.

ANAL GLANDS. Under this name may be described a large and diversified group of glands, found in many animals, and generally characterized by the disagreeable odor of their secretion. Those to which the name most strictly belongs are of frequent occurrence among carnivora and rodents; they consist of follicles which pour their secretion into sacs with muscular walls and narrow orifices, placed one on each side of the anus. According to the most recent investigations, it appears that these sacs are to be considered as prolongations inwards of the common integument, and that two sorts of glands open into them; one of a lobulated structure, having a fatty secretion, and representing

the sebaceous glands of the skin greatly hypertrophied; the other crowded more at the bottom of the sac, tubular, and elaborating the specific secretion. In the hyena, there is a single sac, which opens by a transverse fissure above the vent. There is a gradual passage from true A. G. to others of a somewhat different character. Thus, there are glands called inguinal in the hare and rabbit—little bare places pouring out an unctuous secretion, which are held to be equivalent to A. G., only not inclosed in sacs. The civet cat has an anal sac on each side of the vent; and also two other sacs opening by a common outlet in front of the vent; and from the latter is derived the substance known as civet, which the negroes seek for on the trees where it has been left by the civet cats. The civet gland furnishes a natural link between the A. G. and those more closely connected with the genital apertures, called preputial. The most remarkable are those of the beaver, large sacs found both in the male and female, and which furnish the castoreum of commerce. The beaver has true A. G. besides. The sac which contains the musk of the musk-deer lies in the middle line beneath the skin of the abdomen, and opens at the prepuce. The secretion peculiar to badgers, polecats, and skunks, and which they use as an instrument of defense, shielding themselves from their adversaries by an overpowering and intolerable odor, comes from a pouch situated beneath the tail. In some animals, we meet with secretions similar to some of the above, poured out on other parts of the body. Thus, in the bat, there are glands on the face opening above the mouth, which prepare a fetid oily secretion; the so-called lacrymal follicles of ruminants, and the cutaneous glands of the tail of the deer, secrete a dark unctuous humor; and the temporal gland between the eye and the ear of the elephant pours out an oily substance at rutting-time. The peccary has an odoriferous gland on its back; and the crocodile has a musk-sack under the lower jaw. Anal sacs opening immediately behind the vent are also found in the crocodile and in many serpents.

AN'ALOGUE, a term in comparative anatomy. Organs are *analogous* to one another, or are *analogues*, when they perform the same function, though they may be altogether different in structure; as the wings of a bird and the wings of an insect. Organs, again, are *homologous*, or *homologues*, when they are constructed on the same plan, undergo a similar development, and bear the same relative position, and this independent of either form or function. Thus, the arms of a man and the wings of a bird are homologues of one another. See **HOMOLOGY**.

ANALOGY, a term originally Greek, and which signifies an agreement or correspondence in certain respects between things in other respects different. Euclid employed it to signify proportion, or the equality of ratios, and it has retained this sense in mathematics; but it is a term little used in the exact sciences, and of very frequent use in every other department of knowledge and of human affairs. In grammar we speak of the A. of language, i.e., the correspondence of a word or phrase with the genius of the language, as learned from the manner in which its words and phrases are ordinarily formed. A., in fact, supposes a rule inferred from observation of instances, and upon the application of which, in other instances not precisely, but in some respects, similar, we venture, with more or less confidence, according to the degree of ascertained similarity, and according to the extent of observation from which our knowledge of the rule has been derived. The opposite to A. is *anomaly* (Gr. irregularity); and this term is used not only in grammar, but with reference to objects of natural history which in any respect are exceptions to the ordinary rule of their class or kind. In the progress of science, analogies have been discovered pervading all nature, and upon which conclusions are often based with great confidence and safety. Reasoning from A. indeed warrants only probable conclusions; but the probability may become of a very high degree, and in the affairs of life we must often act upon conclusions thus attained. Reasoning from A., however, requires much caution in the reasoner. Yet even when its conclusions are very uncertain, they often serve to guide inquiry and lead to discovery. Many of the most brilliant discoveries recently made in natural science were the result of investigations thus directed. Where the proper evidence of truth is of another kind, arguments from A. are often of great use for the removal of objections. It is thus that they are employed by Bishop Butler in his *A. of Religion, Natural and Revealed, to the Constitution and Course of Nature*. In law, reasoning from A. must often, to a certain extent, be admitted in the application of statutes to particular cases. Upon similar reasoning, the practice of medicine very much depends. To discover the meaning of any composition, it is also often necessary; the sense of the author in a passage somewhat obscure being in some measure determined according to passages in which he has expressed himself more clearly. The application of this rule to the interpretation of Scripture is a point of difference between Protestants and Roman Catholics, the latter insisting upon the interpretation of difficult passages by ecclesiastical tradition and authority. The extension of it to the whole Scriptures, however, depends upon the admission of their inspiration; but this, when fully admitted, warrants a more confident use of analogical reasoning than in the case of the works, or even of a single work, of an uninspired author. Protestant theologians have very generally employed, with reference to this rule of interpretation, the phrase "A. of faith," deriving it from Rom. xii. 6; but the meaning of the expression in that verse is disputed. However, the reality of an A. of faith, and the right of reasoning from it, are not affected by any criticism on that verse.

ANALYSIS (Gr.), the resolution of a whole into its component parts. In mental philosophy, this term is applied to the logical treatment of an idea so as to resolve it into other ideas which combine to form it. A judgment or proposition may thus also be analyzed. The opposite of A. is *synthesis* (q.v.); and the opposition of these terms is common in other branches of science as well as in mental philosophy. We speak of an *analytic* method in science, and of a *synthetic method*; and both are necessary, the one coming to the assistance of the other to secure against error, and promote the ascertainment of truth. The analytic method proceeds from the examination of facts to the determination of principles; whilst the synthetic method proceeds to the determination of consequences from principles known or assumed. The test of perfection in a theory is the harmony of the results obtained by the methods of A. and synthesis.

Mathematical A., in the modern sense of the term, is the method of treating all quantities as unknown numbers, and representing them for this purpose by symbols, such as letters, the relations subsisting among them being thus stated and subjected to further investigation. It is therefore the same thing with algebra, in the widest sense of that term, although the term algebra is more strictly limited to what relates to equations, and thus denotes only the first part of A. The second part of it, or A. more strictly so called, is divided into the A. of finite quantities, and the A. of infinite quantities. To the former, also called the theory of functions, belong the subjects of series, logarithms, curves, etc. The A. of infinites comprehends the differential calculus, the integral calculus, and the calculus of variations. To the diligent prosecution of mathematical A. by minds of the greatest acuteness, is to be ascribed the great progress both of pure and applied mathematics within the last two centuries.

The A. of the ancient mathematicians was a thing entirely different from this, and consisted simply in the application of the analytic method as opposed to the synthetic, to the solution of geometrical questions. That which was to be proved being in the first place assumed, an inquiry was instituted into those things upon which it depended, and thus the investigation proceeded, as it were, back, until something was reached which was already ascertained, and from which the new proposition might be seen by necessary consequence to flow. A reversal of the steps of the inquiry now gave the synthetical proof of the proposition. The modern mathematical A. affords a much more easy and rapid means of solving geometrical questions; but the ancient A. also afforded opportunity for the exercise of much acuteness, and was the chief instrument of the advancement of mathematical science until comparatively recent times. The invention of it is ascribed to Plato; but of the works of the ancients on geometrical A. none are extant, except some portions of those of Euclid, Apollonius of Perga, and Archimedes.

ANALYSIS, in chemistry, is the term applied to that department of experimental science which has for its object the chemical disunion or separation of the constituents of a compound substance: thus, the resolution of water into its components, hydrogen and oxygen; of common salt into chlorine and sodium; of marble into lime and carbonic acid; of rust into iron and oxygen; of sugar into carbon, hydrogen, and oxygen; and of chloroform into carbon, hydrogen, and chlorine—are all examples of chemical A. This department of chemistry, therefore, takes cognizance of the breaking down of the more complex or compound substances into their more simple and elementary constituents, and is antagonistic to *chemical synthesis*, which treats of the union of the more simple or elementary bodies to produce the more complex or compound. Chemical A. is of two kinds: *Qualitative A.*, which determines the quality or nature of the ingredients of a compound, without regard to the quantity of each which may be present; and *quantitative A.*, which calls in the aid of the balance or measure, and estimates the exact proportion, by weight or volume, in which the several constituents are united. Thus, *qualitative A.* informs us what water, marble, common salt, etc., are composed of; but it remains for *quantitative A.* to tell us that water consists of 1 part of hydrogen by weight united with 8 parts of oxygen; that marble is composed of 56 parts of lime and 44 of carbonic acid; common salt, of 35½ parts of chlorine and 23 of sodium; turpentine, of 30 carbon and 4 hydrogen; chloroform, of 12 carbon, 1 hydrogen, and 106½ chlorine.

The divisions of inorganic (mineral) chemistry and organic (vegetable and animal) chemistry have led to a corresponding classification of chemical A. into *inorganic A.*, comprehending the processes followed and the results obtained in the investigation of the atmosphere, water, soils, and rocks; and *organic A.*, treating of the modes of isolation and the nature of the ingredients found in or derived from organized structures—viz., plants and animals. Both departments afford examples of what are called *proximate* and *ultimate A.* Proximate A. is the resolution of a compound substance into components which are themselves compound: thus, in inorganic chemistry, marble is resolved into lime (calcium united with oxygen) and carbonic acid (carbon with oxygen); whilst ultimate A. comprehends the disunion of a compound into its *elements* or the simplest forms of matter: thus, lime into calcium and oxygen; carbonic acid into carbon and oxygen, water into hydrogen and oxygen. Organic chemistry affords still better examples of each class: thus, ordinary wheat-flour, when subjected to proximate A., yields, as its proximate components, gluten (vegetable fibrine), albumen, starch, sugar, gum, oil, and saline matter; but each of these proximate ingredients is in itself compound, and when they undergo ultimate A., the gluten and albumen yield, as their ultimate elements or

constituents, carbon, hydrogen, oxygen, nitrogen, sulphur, and phosphorus; and the starch, sugar, gum, and oil are found built up of carbon, hydrogen, and oxygen.

Several other terms are in use in chemical treatises: thus *Gas A.* is applied to the processes employed in the examination of the various gases, and is every day becoming of more and more importance and interest. *Metallurgic A.* includes the smelting of metallic ores, the assays of alloys of gold, silver, etc., and, in general, everything that pertains to the ultimate A. of metallic ores and compounds. *Agricultural A.* is restricted to the examination of manures, feeding-stuffs, and soils; *medical or physiological A.* to the investigation of blood, urine, and other animal fluids and juices, and the examination of medicinal compounds; whilst *commercial A.* is the term used where great accuracy or nicety of detail is not required in an A., but where the commercially important constituents alone are determined, as the separation and recording of the amount of phosphates, ammonia, and alkaline salts in a sample of guano; the total amount of saline matter in a certain water; the iron in an iron-stone, the lime in a limestone, etc.

ANALYTICAL CHEMISTRY is that department of chemistry which takes cognizance of analyses. The analytical chemist requires some peculiar apparatus, together with re-agents, generally solutions, by the addition or reaction of which the nature and amount of the ingredients of a compound are determined.

ANALYTICAL LANGUAGE. See **PHILOLOGY**.

ANALYZER, that part of a polariscope (q.v.), by which, when light has been polarized, its properties are tested, usually something corresponding to the polarizer, as a movable reflecting plate, a tourmaline, or a doubly refracting crystal.

ANAM or **ANNAM**, a French protectorate, forming a part of French Indo-China, formerly an independent kingdom including Lower Cochin China and Tonquin, now an ill-defined strip of territory extending along the coast of the China sea. The country is mountainous in the interior, has rich plains in the n. and s., with excellent harbors along its coast. Area, including the land acquired from Siam in 1893, about 106,000 sq. m. Pop. about 5,000,000. At the beginning of this century the kingdom included Tonquin, Tsiampa or Champa and a part of the ancient kingdom of Cambodia, also six provinces of Lower Cochin China, namely: Saigon, Bienhoa, Mytho, Vinhlong, Chander, and Haytien. This kingdom was under a kind of feudal subjection to the Emperor of China until released by the French. In 1862, the King of A. was obliged to accept French protection, in consequence of a rebellion among his Tonquinese subjects, and he also lost (1867) the six provinces mentioned above. The French continued to encroach upon the territory and rights of the King of A., until, in 1874, he was forced to accept a treaty which reduced him to vassalage; securing to A., however, independence of all foreign powers, especially of the emperors of China. For this protection the emperor of A. pledged himself to accommodate his policy to that of France, to annul the enactments affecting the Roman Catholic religion, to open several ports to foreign commerce, and to admit to those ports French consuls and a limited number of armed guards. This treaty opened the ports of Haiphong and Hanoi in 1875; and of Quinhon in 1876. Haiphong is a mere village on one of the mouths of the Songkoi, or Hongkiang (red river), at a point reached by vessels drawing about 14 ft. of water. Hanoi, also on the Hongkiang, is properly the capital of Tonquin. Quinhon is a seaport in 13° 50' n. and 69° e. China refused to recognize the entire independence of A., and this action brought about war between China and the French occupants in Tonquin. The Chinese were aided by Anamites who were anxious to expel all foreigners. Finally, in 1883, the French government decided to annex the province of Tonquin. The war was closed by the treaty of June 6, 1884. Tonquin was annexed to France, and with the ratification of the treaty on Feb. 23, 1886, a French protectorate was formally established over Anam. The port of Thuan-an was ceded to France and the ports of Qui-Nhon, Turane and Xuan Dap were opened to European commerce. The French stipulated for control of the Anamite finances, and were to occupy permanently the citadel at Hué. The form of government in Anam is a monarchy. The king administers internal affairs, but under the control of French officials. The French resident-general for Anam and Tonquin lives at Hué. The country is fertile, producing rice, maize and other cereals, spices, tobacco, sugar, excellent timber, caoutchouc, dye, and raw silk. The commerce is considerable, but is chiefly confined to trade with China and Japan. The principal exports are silk and cinnamon. Iron, copper and silver are found, and in 1891 a French company was formed to work the coal mines. The people are of Mongol stock and speak a monosyllabic language. In the towns there is a considerable number of Chinese, and the population in the upland tracts consists of M'ois, a race generally of greater stature and lighter complexion than the Anamese. The latter are found for the most part in the coast region. They have certain peculiar racial characteristics, especially a curious mode of walking, due to the structure of the pelvis and the thigh-bone. The educated classes among the natives are generally either Buddhists or believers in the doctrine of Confucius, but there are between 400,000 and 500,000 Roman Catholics in the country. The capital is Hué with a population variously estimated at from 15,000 to 30,000. Among the works on Anam and French Cochin-China are the writings of Bouillebaux, De Rhins, Lemire, Launay, Ramaud, and De Lanessan. See also Frey, *L'annamite, mère des langues* (1892). See **COCHIN CHINA**; **SAIGON**. For type of people, see illus., **ASIA**, vol. I.

ANAMBŒ. See ANNAMABŒ.

ANAMIR' TA. See COCCULUS INDICUS.

ANAMORPHOSIS, an ideal change of development or form that may be found in the members of a group of plants or animals. It has been suggested that by the process of A. animals and plants of the present time have been developed. In optics A. is a drawing, which when viewed directly appears distorted or confused, but whose image in a curved mirror, viewed from a proper point, is an intelligible and consistent picture.

ANA'NAS. See PINE-APPLE.

ANANI'AS, one of the members of the young church at Jerusalem who conspired with his wife, Sapphira, to make a false pretense respecting their gift of property to the community of the brethren, and was, with his wife, struck dead. Another A. is mentioned in Acts ix. 12, and elsewhere. Still another A. was a high-priest at Jerusalem (Acts xxiii. 2).

ANAPHRODISIACS. These are substances used to lessen the sexual desire. In the first place all causes of genital irritation should be removed. Careful cleansing should be insisted on, and in many cases circumcision is needed. Saccharine or highly acid urine should be corrected. Distension of the bladder should be avoided if possible. Vesical calculus, worms, hemorrhoids, and anal fissure may all act as causes of sexual excitement, and should be treated if present. Other rarer lesions in this neighborhood may cause it. Constipation should be relieved. The clothing, especially at night, should not be too warm. The bed should be hard. The diet should be restricted in amount, chiefly vegetable, and spices and stimulants of all kinds should be avoided. Hard mental work and abundant exercise, especially with the arms, are strongly indicated. Ice, applied locally, and cold baths, local or general, are very potent in allaying sexual excitement for the time. Besides these measures, some drugs are of value. The best are probably the bromides. They should be given in full doses and if necessary pushed to the physiological limit. Next to these comes camphor, which should be used in the same way. The nauseants are valuable temporary expedients, but cannot be used in a prolonged treatment. It must be remembered that nymphomania and satyriasis, when at all pronounced, are usually due to some organic lesion about the genitals. In most other cases they are evidence of insanity.

ANARCHISTS, those who desire to abolish all forms of authority and establish a system of complete individual liberty. Proudhon (q.v.) must be regarded as the first who attempted to give a scientific expression of the theory, although Josiah Warren (q.v.) had formulated similar views in the U. S. several years before the appearance of Proudhon's *What is Property?* In this work, property in its existing form is declared to be the cause of all social evils, but so closely connected with the state that its bad effects can be prevented only by the destruction of the state itself, which, under whatever form it exists, is considered synonymous with inequality and misery, since whether by the will of one or of many it subjects the individual to the will of another. Proudhon considers contract the only bond that can unite society, not the contract of Rousseau's theory, the fallacy of which he keenly exposes, but an agreement supported by no external force, binding only upon the parties to it, and involving no further consequences than result from the mere personal promise. Communism he regards with no less disfavor than the state; the latter he calls the exploitation of the weak by the strong, the former exploitation of the strong by the weak. Of the many evils of the existing economic system, the "money monopoly" attracts his especial attention, and to destroy money as a medium of exchange would be his first step; in place of it there should be a method of basing bank paper upon products, the application of his theory that "services should exchange for services and products for products." The anarchists of to-day are divided into two groups: First, the faithful followers of Proudhon, who call themselves Individualistic Anarchists, and second, those who owe a portion of their theory to Marx, the Communistic Anarchists, or Internationalists. The headquarters of the former school is at Boston, where their organ, *Liberty*, is published. In their denunciation of the state, they make no exception of the U. S. government, which they consider as oppressive as any of the European monarchies. Elections they deem tyrannical and foolish, and they neither vote nor perform the duties of citizens in any way, if they can avoid it. Courts of justice are instruments of despotic power, and compulsory jury service a cruel infringement upon the rights of individuals. For the accomplishment of their ends, however, they look not to deeds of violence, which they vehemently oppose, but to a peaceful evolution, in the course of which, the continued contemplation of political corruption, capitalistic tyranny, and the countless evils that disgrace our present system will impel men to cast off the restraints of government and establish a social order based on individualism. True to the principles of Proudhon, they deny the existence of God, but would permit believers to worship without molestation, provided only that the Church be self-supporting, the priest paid by those who listen to him. Averse to any form of constraint, they view with abhorrence attempts to check social vices by legislation, trusting to the sway of reason and the sense of right to keep society pure. Civil marriage should be abolished,

and in place of it they advocate "autonomistic" marriage, a sort of partnership from which either party could be released at will. The supporters of these views number about 5000 in the U. S.

The Communistic Anarchists differ from these, especially as to the means by which the new order of things is to be brought about; they shrink from no plan of violence conducive to their ends. Forming the extreme left of the International Workingman's association (q. v.), they separated from the more moderate party, and in 1872 were expelled with their leader, Bakunine, who advocated an international revolutionary movement of the laboring classes to culminate in a general insurrection. Another point of difference between them and the first group is that they do not entirely reject association, but limit it to very small numbers of individuals by carrying the principle of local self-government to an extreme. Their ideal, like that of the Individualistic Anarchists, is absence of government, but they direct their efforts primarily against private property, while the followers of Proudhon hold that after the destruction of the state property would no longer be dangerous and might continue. In their ultimate results, however, the ideals of the two schools contemplate social systems of a very similar character. H. L. Osgood; *Political Science Quarterly*, March, 1889; Proudhon's *Works*; *Liberty*, Boston; Josiah Warren's *Works*; Bakunine, *God and the State*. See COMMUNISM, NIHILISM.

ANARCHY (from the Gr. *a*, privative, and *arche*, government), the state of society without any regular government, when a country is torn by the strife of parties, and no law or authority remains. Complete A. is necessarily rare and of short duration; but conditions approaching to it often arise after revolutions and gross abuses in government; and in such cases it is apt to become, as in the South American states, a chronic or permanent evil, attended with constant national decay.

ANARRHICHAS. See WOLF-FISH.

ANAS, a Linnæan genus of birds, included in the order *palmipedes* (web-footed birds) of the system of Cuvier, and divided by recent ornithologists into a number of genera; one of which, retaining the name A., contains the true ducks, and others contain the swans (*cygnus*), geese (*anser*), scoters (*oidemia*), garrets (*clangula*), eiders (*somateria*), pochards (*fuligula*), shovelers (*rhyncaspis*), shieldrakes (*tadorna*), musk-ducks (*cairina*), teal (*querquedula*), widgeons (*mareca*), etc. These, with mergansers (*mergus*) and flamingoes (*phœnicopterus*), constitute the family *anatidæ* of some ornithologists. Cuvier places them in a family called by him *lamellirostres*, and distinguished by a thick bill, horny only at the nail-like extremity, and elsewhere invested with a soft skin, the edges furnished with laminae, or with small teeth particularly adapted for the purpose of separating the food from the mud which is often taken into the bill along with it. The laminae, and large and broad bill, are the chief characteristics of the old genus A. Some, as the true ducks, subsist in great part on small insects; others, as geese and swans, almost exclusively on vegetable food. The species are very numerous, distributed over all parts of the world, some of them very abundant in the polar regions. Some are important for their feathers or down, others for their flesh and for their eggs. A few have been domesticated, and are commonly kept for economic uses. See DUCK, GOOSE, SWAN, EIDER, BARNACLE, TEAL, etc.

ANASTASIUS I., emperor of the east, was b. in 430 A.D., at Dyrrachium, in Epirus, of an obscure family. The early portion of his life is unknown to history. On the death of Zeno, he was proclaimed emperor by the senate, and crowned on the 11th April, 491, at the age of 60. He owed his elevation to Ariadne, widow of Zeno, whom he married. No monarch was ever more notable for his heresies. One of his generals, Vitalian, taking advantage of this unpopular feature of his character, revolted, ravaged Thrace, Scythia, and Moesia, compelled A. to promise to recall the orthodox bishops whom he had banished, and secured for himself the title of governor of Thrace. A., however, had some good natural qualities, and performed certain praiseworthy actions. He suppressed the cruel and degrading spectacles where men fought with wild beasts, abolished the sale of offices, the tax on domestic animals, which had existed since the days of Vespasian, built a wall on the w. side of Constantinople to defend it from the incursions of the barbarians, constructed aqueducts in the city of Hierapolis, made a harbor at Cæsarea, and restored the "pharos" or light-house at Alexandria. He died 8th July, 518.

ANASTASIUS II., emperor of the east, elected to the throne of Constantinople by the senate and people in 713. He organized a formidable naval force which mutinied at Rhodes and proclaimed Theodosius, a low person, emperor; and this Theodosius took Constantinople six months later, and deposed Anastasius, who escaped to Thessalonica and became a monk. In 719, he led a revolt against Leo, the successor of Theodosius, but fell into Leo's hands and was put to death in the same year; but some authorities give the date of his death as 720.

ANASTASIUS I., patriarch of Constantinople, was b. in the second half of the 7th century. He favored the party of iconoclasts, or image-breakers. He owed his elevation to the emperor Leon, who exacted from him a pledge that he would assist in the destruction of the images. A. kept his word; but having made himself obnoxious to the new

emperor, Constantine Copronymus, the latter (743) seized him, put out his eyes, and marched him through the hippodrome (race-course) mounted on an ass with his head to the tail. He d. in 753.

ANASTASIUS I. was elected pope, or rather bishop of Rome, 398 A.D. He succeeded Siricius, one year after the death of Ambrose. Under his pontificate, flourished Chrysostom, Augustine, and Jerome. The most conspicuous act of his life was the reconciliation of the church at Antioch with that of Rome, after a schism of 17 years. Among the epistles attributed to A., two are obviously apocryphal; the one addressed to Nere-nianus; the other to the German bishops. The latter commanded the faithful to remain standing while the gospel was read in the churches, that neophytes should receive holy orders only on the recommendation of five bishops, and that the Manichæans, who had been expelled from Rome, should not be admitted into Germany. But the first of these epistles is posterior to the death of A., and the second anterior to his accession to the pontificate. A. was vehemently opposed to the doctrines of Origen, one of whose works (*Peri Archōns*, i.e., *Concerning Principles*) he condemned as heretical. For this he is praised by Jerome, who calls him a man of a holy life, of a "rich poverty," and of an apostolical earnestness. During his life, several councils were held, at Carthage, Constantinople, Ephesus, and Toledo. He d. Dec. 14, 401 A.D.—There were three other popes of this name: ANASTASIUS II. (496–498), ANASTASIUS III. (911–913), and ANASTASIUS IV. (1153–54). See POPE.

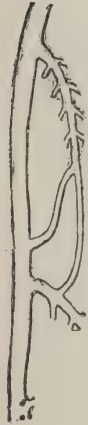
ANASTASIUS, SAINT, surnamed ASTRIC, apostle of the Hungarians, was b. in 954, and d. in 1044. A Frenchman by birth, he finally settled, after various changes, at the court of Stephen, duke of Hungary, where he became very influential, and was intrusted with the ecclesiastical organization of the land. All his energies were devoted to securing the triumph of the Christian faith.

ANASTATIC PRINTING. See PRINTING.

ANASTATICA. See ROSE OF JERICHO.

ANASTOMO'SIS (Gr., the making of a mouth or opening), an anatomical term used to express the union of the vessels which carry blood or other fluids, and also, for convenience' sake, the junction of nerves. The veins and absorbents anastomose to form large single trunks, as they approach their ultimate destinations. The arteries break up into small branches, for the supply of the tissues, and each small vessel again communicates with others given off above and below. At each large joint there is a very free A., so that the safety of the limb beyond may not be entirely dependent on the single arterial trunk passing into it, exposed as it is to all the obstructive influences of the different motions of the limb. After the main artery has been permanently obstructed, the anastomosing vessels enlarge, so as to compensate for the loss; but after a time, only those whose course most resembles the parent trunk continue enlarged, and the others gradually regain their ordinary dimensions.

An idea of the profusion of this anastomosing system may be formed from the fact that if the innominate artery, or great vessel destined for the supply of the right upper half of the body, be tied, and those on the left side injected with size and vermilion, the injection will flow freely into the arteries of the right arm, through branches as minute as they are numerous.



Arteries
anastomosing.

ANATH'EMA (Gr., a thing set or hung up or apart—i.e., as consecrated), a word originally signifying some offering or gift to Deity, generally suspended in the temple. Thus, we read in Luke xxi. 5, that the temple was adorned "with goodly stones and gifts" (*anathemata*). It also signifies a sacrifice to God; and, as the animals devoted to be sacrificed could not be redeemed from death, the word was ultimately used in its strongest sense, implying eternal perdition, as in Rom. ix. 3; Gal. i. 8 and 9; and other places. In the Catholic church, from the 9th c., a distinction has been made between excommunication and anathematizing; the latter being the extreme form of denunciation against obstinate offenders. The synod of Pavia, in 850, determined that all transgressors who refused to submit to discipline, such as penance, should be not merely excommunicated, but anathematized, and deprived of every kind of Christian hope and consolation. Such a sentence could not be pronounced without the concurrence of the provincial bishops with their metropolitan. See EXCOMMUNICATION.

AN'ATHOTH, a t. in Palestine, 4 m. n. of Jerusalem; the birthplace of Jeremiah; a city of priests and of refuge. It was an important place, but it is now supposed to exist only in the little village of Anata, at the top of a hill n. of Jerusalem, commanding a view of the Dead sea. At A., Jeremiah bought the field as a symbol of the return from captivity.

ANATO'LIA (Gr. Anatolé, the east, i.e., from Constantinople) is the modern name for Asia Minor; Turkish, Anadolí. It may be considered as coincident with the peninsula; the boundary line on the e. between it and Armenia and Mesopotamia, not being natural, cannot be well defined. The area of the peninsula exceeds 200,000 square miles. It constitutes the western prolongation of the high table-land of Armenia, with its border mountain-ranges. The interior consists of a great plateau, or rather series of plateaus.

rising in gradation from 2400 to 5000 ft., with bare steppes, salt plains, marshes, and lakes; the structure is volcanic, and there are several conical mountains, one of which, the Agridagh (Argæus), with two craters, rises 10,000 ft. above the plain of Kaisarijeh, which has itself an elevation of between 2000 and 3000 ft. The plateau is bordered on the n. by a long train of parallel mountains, varying from 4000 to 6000 ft. high, and cut up into groups by cross valleys. These mountains sink abruptly down on the n. side to a narrow strip of coast; their slopes towards the interior are gentler and bare of wood. Similar is the character of the border ranges on the s., the ancient Taurus, only that they are more continuous and higher, being, to the n. of the bay of Skanderun or Issus, 10,000 to 12,000 ft., and further to the w., 8000 to 9000 feet. The w. border is intersected by numerous valleys, opening upon the archipelago, through the highlands of the ancient Caria, Lydia, and Mysia, to the northern part of which mounts Ida and Olympus belong. Between the highlands and the sea lie the fertile coast-lands of the Levant. The rivers of A. are not considerable; the largest are the Yeshil Irmak (Iris), the Kisil Irmak (Halys), and the Sakkariah (Sangarius), flowing into the Black sea; and the Sarabat (Hermus) and Minder (Mæander) into the Ægean.

The climate wears on the whole a south-European character; but a distinction must be made of four regions. The central plateau, nearly destitute of wood and water, has a hot climate in summer, and a cold in winter; the s. coast has mild winters and scorching summers; while on the coast of the Ægean there is the mildest of climates and a magnificent vegetation. On the n. side, the climate is not so mild, nor the productions of so tropical a kind as on the w.; yet the vegetation is most luxuriant, and a more delightful or richer tract than the coast from the sea of Marmora to Trebizond, is hardly to be found. The whole peninsula, however, is liable to earthquakes.

In point of natural history, A. forms the transition from the continental character of the east to the maritime character of the west. The forest-trees and cultivated plants of Europe are seen mingled with the forms peculiar to the east. The central plateau, which is barren, except where there are means of irrigation, has the character of an Asiatic steppe, more adapted for the flocks and herds of nomadic tribes than for agriculture; while the coasts, rich in all European products, fine fruits, olives, wine, and silk, have quite the character of the s. of Europe, which on the warmer and drier s. coast shades into that of Africa.

The inhabitants consist of the most various races. The dominant race are the Osmanli Turks, who number over 1,000,000, and are spread over the whole country; next to these come the Turkomans, belonging to the same stock, and speaking a dialect of the same language. These are found chiefly on the table-land, leading a nomadic life; there also live hordes of nomadic Kurds. Among the mountains e. of Trebizond are the robber tribes of the Lazes. The population of the towns, in addition to Turks, consists, in the w., chiefly of Greeks and Jews; and in the e., of Armenians; the non-Turkish population, along with Europeans in the maritime marts, have the whole commerce of the country in their hands. There is much uncertainty about the population of the peninsula, the census of 1885 not having been completed, but estimates place it at nearly 9,000,000. The political and social arrangements are much as in the rest of Turkey (q. v.). One peculiarity is the old Turkish system of vassal-dynasties, the Derebegs (valley chiefs), who, like the feudal lords of the middle ages in Europe, are hereditary rulers and military commanders of their district, under the suzerainty of the sultan. This institution is in greatest force in the n. e. of the peninsula. The power of these feudal chiefs, however, was broken by Sultan Mahmud.

This region was the early seat of civilization, in the west the Greek provinces contained some of the greatest and most famous cities in the world. Yet the country never became united, and has passed under the supremacy of one race after another. It has been the scene of numerous wars both in ancient and in modern times. It has been the battle-ground of Medes and Persians, of Greeks and Persians, of Romans and Parthians, and of continual conflicts between Arabs, Seljuks, Mongols and Ottoman Turks. The last named people acquired a part of this region in the fourteenth century, wresting it from the weakening grasp of the Byzantine emperors. Since 1453 the Ottoman Turks have ruled it from Constantinople. The country is divided at present into vilayets or governments, under governors-general and each of these again into several *sandjaks*, or provinces, under lieutenant-governors. The chief cities are Smyrna, Broussa, Konieh, Sinope, Angora, Kutaieh and Trebizond. Most of the islands of the Archipelago belong to Anatolia. The ancient divisions of this region were Pontus, Paphlagonia, Bithynia, Galatia, Lycaonia, Phrygia, Pisidia, Pamphylia, Cappadocia, Mysia, Lydia and Syria.

ANATOMY (Gr., to cut up, to dissect) is the science, which, in its broadest sense, treats of the form and structure of organic bodies, a knowledge of which is acquired by the dissection or separation of the constituent parts.

In its ordinary sense, the term is understood as applying to the normal human body; but for the sake of clearness, we speak of Human Anatomy, which treats of the structure of man.

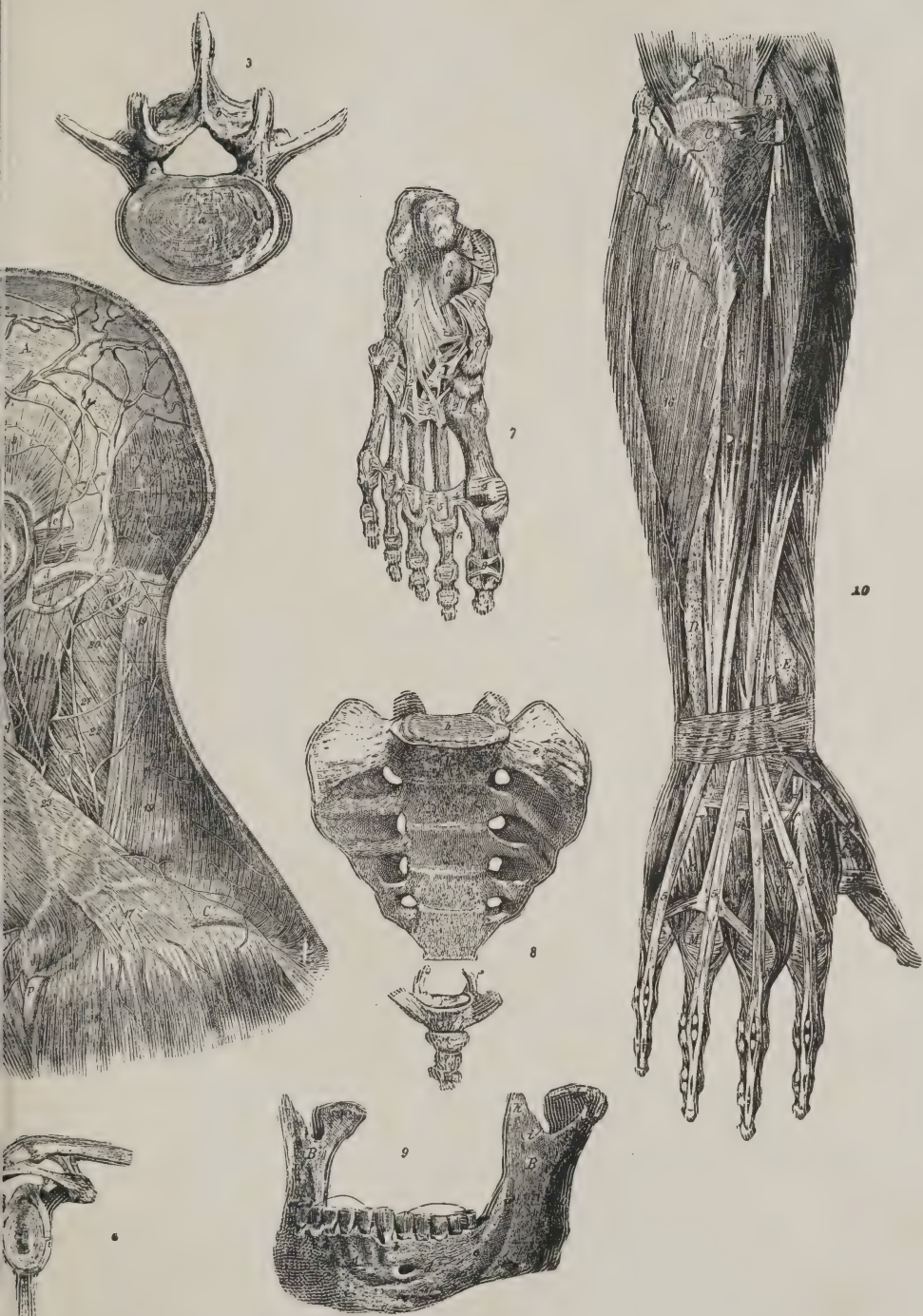
The anatomy of animals is often called Zootomy; that of plants vegetable A., or Phytotomy.

COMPARATIVE ANATOMY comprehends the investigation and comparison of the different kinds of organic bodies.

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ANATOMY.—1. Skeleton. 2. Head, after removal of the skin. 3. Lumbar vertebra. 4. Front view of sacrum and coccyx. 5. Lower jaw. 10. Fore arm with skin removed.



Male pelvis, front view; 5. From above. 6. Shoulder joint, front view. 7. Right foot.

On examining the structure of any organized body, we find that it is made up of various members or organs by which its functions are executed. These organs are, moreover, themselves made up of certain materials called tissues. Hence, we speak of the woody or cellular tissue of plants, and of the bony, vascular, or nervous tissues of animal organs.

Anatomy, therefore, is divided into two branches, General and Special. *General A.*, or Histology (see Histology), treats of the minute structure of the body.

SPECIAL, OR DESCRIPTIVE A., treats of the several members, organs, or regions; describing their outward form and internal structure, their relations and connections, and the successive conditions which they present in the progress of formation or development.

According to this mode of study, which is essential as an introduction to Physiology, *A.* has been divided into six branches:

1. Osteology, which treats of the bones.
2. Lyndesmology, which describes ligaments and joints.
3. Myology, which explains the system of muscles and their actions.
4. Angeiology, which describes the blood and lymph channels, the arteries, veins, and lymphatics.
5. Neurology, which treats of the nervous system.
6. Splanchnology, which describes the viscera or internal organs.

Descriptive A. may be treated of in two methods, viz., *Systematic* or *Topographical*.—In the former, the several parts or organs are considered in systematic order, according to their structure, their connections, and their relations to vital functions. In the latter, the parts are described in order of their position or association in any region of the body.

Systematic A., therefore, is better adapted for the elementary and complete study of the structure of organs.

Topographical A. for the study of particular regions in relation to medicine and surgery. Hence we speak of it often, in this respect, as Surgical or Applied *A.*

The adult or fully formed condition of the body is assumed commonly as the subject of the description; but it is obvious, that a consideration of the structure of the body and its organs in various stages of life, is essential to render the knowledge of the anatomy complete. To the description of the origin and formation of parts in the fœtus or embryo, the name *Embryological A.* is given.

The study of Anatomy may be viewed from the Physiological or the Morphological standpoint. In the former case, materials are supplied relating to the structure of parts, from which an explanation may be sought of their functions.

In its morphological aspect, it investigates and combines the facts relating to the structure and relation of organs, from which may be deduced general principles as to the construction of the human or the animal body. In the determination of these principles, it is necessary to combine the knowledge of the anatomy of animals with that of man, and both with the history of development.

Practical A. includes *dissection* and the making of *preparations*. When a part or organ is prepared, so that its form or position can be more clearly demonstrated, it is termed an *anatomical preparation*. A *bone preparation*, for example, is made by first clearing away all the adherent parts, by boiling and bleaching the specimen to make it white and dry. When the whole system of bones so prepared is connected together by wires, in the natural order, we have an *artificial skeleton*. Bodies for dissection are preserved from rapid decomposition, by means of arsenical solutions injected into the arteries. The large arterial trunks and their smaller branches are prepared for demonstration, by the injection of a mixture of Plaster of Paris colored with red lead, which quickly hardens and brings the vessels into prominence. Other materials are also used. In the case of the lymphatics, quicksilver is often employed and renders the smallest channels easily demonstrable.

Preparations may be dried and varnished, or kept moist in alcohol or other fluids. A series of such preparations "dried" and "wet," arranged in proper order, constitute an *anatomical museum*.

As it is impossible to preserve all parts in their integrity for any length of time, artificial copies in wood, ivory, wax, and *papier-maché*, are made with great exactitude.

Apart from dissections and preparations of the natural organs, the most general and available assistance in the study of anatomy is found in anatomical plates and engravings. This assistance was known in ancient times, and in the 16th century the greatest artists—Leonardo da Vinci, Michael Angelo, Raphael, Titian and Dürer—gave their aid in designing anatomical figures.

Lithographic and photographic plates are now generally employed.

Among the numerous illustrations of anatomy which we now possess, may be mentioned the old works by Vasal (1543), Eustachius (1714), Bidloo (1685), Albin (1747), Haller (1743–56), and Vicq d'Azyr (1786–90).

In the present century the excellent works of Caldani (Venice, 1801–14) Mascagni (Pisa, 1823), Langenbeck (Göttingen, 1826), Bougery, and Jacob (Paris, 1832), Arnold (Zurich, 1838), Bock (Leipzig, 1840), Braune, Henke, and Luschka, are well known.

HISTORY OF A.—From the earliest times, it is probable that certain persons took

advantage of favorable circumstances to acquaint themselves with anatomy. The Druids, who were at once the priests, judges, and physicians of the people, demanded of those who came for their advice, human victims as sacrifices, and were themselves the executioners. It is not improbable, therefore, that they availed themselves of these opportunities of acquiring anatomical knowledge. Galen thinks Æsculapius probably dissected animals for the instruction of his pupils. His descendants, the Æsclepiades cultivated anatomy to some extent.

The rabbins tell us that, although among the Jews the touching of a dead body involved ceremonial uncleanness, they did not entirely neglect the subject, which they studied from the carefully prepared bones of their ancestors, and acquired, more or less, in the necessary manipulations of embalming. They counted 248 bones and 365 veins or ligaments.

In the Iliad, Homer shows a certain amount of anatomical knowledge in his description of wounds.

Pythagoras first reasoned physiologically from observations made by him in Egypt, where he witnessed the sacrifices and also the Egyptian methods of embalming.

Alcmæon of Crotona, his disciple, first dissected animals to obtain a comparative knowledge of human anatomy.

Democritus also dissected animals.

Hippocrates II., b. in Cos 35 A.M., was the first author who treats A. as a science. He caused a skeleton of brass to be cast, which he consecrated to the Delphian Apollo, with the view of transmitting to posterity proofs of the progress he had made, and of stimulating others to the study.

Aristotle, who lived 384 B.C., does not appear to have dissected men; and he states that the parts of a man are unknown to him, or that they possess nothing certain on the subject beyond what can be drawn from the probable resemblance of corresponding parts of other animals. He first gave the name *Aorta* to the great artery.

Diocles (B.C., 380), was the first who treated of the proper method of conducting anatomical examinations for the purposes of demonstration. No real progress was made in A., however, owing to the researches being confined to animals, till the time of Erasistratus, b. about 300 B.C., who was the first to dissect human bodies. He discovered, among other things, the lacteal vessels. Fragments of his writings are preserved in the works of Galen. Parthenius, who lived 200 B.C., published a book *On the Dissection of the Human Body*.

In the first part of the Christian Era, the dissection of human subjects was forbidden under heavy penalties. Rufus, the Ephesian, 112 A.D., taught A. in a more exact manner, and devised a more exact nomenclature. He made use of animals, however, in his demonstrations. Galen, 131 A.D., dissected apes as being most like human subjects, though he occasionally obtained bodies of children exposed in the fields, or of persons found murdered, which, however, he was obliged to dissect in secret. There was at this time no regularly prepared skeleton, as there was a Roman law forbidding the use of dead bodies. Galen's writings show a knowledge of human A. Soranus had considerable knowledge derived from human subjects. Moschion, had some anatomical illustrations engraved at the end of the 4th century. Meletus wrote a treatise *On the Nature and Structure of Man*. Theophilus, a monk in the 7th century, published a good abridgment of Galen's A. Among the Arabs, A. made small progress, which is accounted for by their religion, which prohibited contact with dead bodies. Until the time of Frederick II., King of Sicily (1194-1250) the subject of A., was practically neglected. This king passed a law forbidding any one to practice surgery without having first acquired some knowledge of A. He founded a chair of A., where the science was demonstrated for five years to many students who came from all parts.

Some time after a similar school was established at Bologna, but no material progress was made. The University of Montpellier was founded by Pope Nicholas IV., in 1284, and the chair of A. was filled with distinction by Bernard Gordon, who published a huge book called *Liberum Medicinæ*. Mundinus, b. Milan, 1315, is considered the real restorer of A. in Italy. He publicly demonstrated it, and published a work which was the text-book in the Academy of Padua, 200 years afterwards.

Then came Guy de Chauliac, who first correctly described the humerus.

Matheus of Grado published several anatomical works about 1480. Gabriel de Leibus, published a confused and imperfect work in Verona, 1495.

André Lacuna (1535), Gonthier (1536), Driander (1537), Sylvius (1539) Levasseur and Gesner, were celebrated for A.; but especially Andrew Vesalius, b. 1514, who published a great work on A. before he was 28 years of age.

Wm. Horman, of Salisbury, in 1530, wrote *Anatomia Corporis Humani*. Then came Ingrassias, and others of less note. Thomas Gemini, of London, in 1545, engraved upon copper the anatomical figures of Vesalius, which had appeared in Germany upon wood.

Thomas Vicary, in 1548, is said to be the first who wrote in English on A. He published *The Englishman's Treasure, or the True A. of Man's Body*. John Ligæus, in 1555 published an anatomical treatise in Latin hexameters.

Frances (1556), Valverde, Columbus, and others, wrote works of great merit. In 1561, Gabriel Fallopius was Professor of A. at Padua, and made many original discoveries.

In the 17th century, progress was rapid. Harvey, in 1619, discovered the circulation of the blood, and the microscope was used to detect the structure of minute vessels.

Asselli, in 1622, discovered and demonstrated the existence of the lymph vessels, and his conclusions were supported by the investigations of Pecquet, Bartholin, and Claus Rudbeck.

The glandular organs were investigated by Wharton; while Malpighi, Swamerdam, and in the following century, the illustrious Ruysch, by the use of injections and the microscope, gave a new impulse to research in the minute structures.

Eminent names are numerous in the history of A. of the 18th century. In Italy, which still retained its former prominence, we find Pacchioni, Valsalva, Morgagni, Santorini, Mascagni, and Cotunni.

In France, Winslow, D'Aubenton, Lieutaud, Vicq d'Azyr, and Bechat, the founder of general A.

In Germany, Haller and Meckel prepared the way for the greater achievements in the 19th century. In Great Britain, Cowper, Cheselden, Hunter, Cruikshank, Monro, and Charles Bell, contributed much to the knowledge of the science.

Holland was worthily represented by Boerhaave, Albinus, Camper, Sandifort, and Bonn.

On the boundaries of the two centuries we find the names of Sömmerung, Loder, Blumenbach, Hildebrand, Reil, Tiedemann, and Leller—nearly all connected with practical medicine, which was much benefited by their studies in A.

The anatomical bibliography of the present century is so extensive and comprehensive, that a mere mention of the works in general and special departments of the science would far exceed the limits of this article.

Among the well-known contributors to the literature of Embryological and Comparative A., may be mentioned the names of Owen, Huxley, Allen Thompson, F. M. Balfour, and Michael Foster, in England.

In Germany, S. Strikker, S. L. Schenk, Albert M. Köhlker, His, Kupfer, Kohlmann, and Gegenbauer.

Gegenbauer's *Comparative Anatomy* (Eng. Trans.). Balfour and Foster. *Elements of Embryology*, etc., 1874, and Balfour's *Comparative Embryology* (London, 80-'81) are all standard works on the subjects named.

In the department of the A. of the nervous system, the older works of Tiedmann 1816, Reichert, '59-61, Schmidt and Lockhart Clark, 1862, are well known. Besides this much has been furnished to the advancement of this important part of the subject, by the writings of His, '79, Löwe, '80, Schwalbe, '81.

Among the many works on A. which can be confidently recommended to the student, are the following: Gray's *Anatomy, Descriptive and Surgical* (American ed., '87); Quain's *Anatomy*, 2 vols.—Leidy, *Treatise on Human Anatomy*; Allen's *System of Human Anatomy*; Ellis's *Demonstrations on Anatomy*; Holden's *Osteology*; Morris, *Anatomy of Joints*; Holden's *Guide to the Dissection of the Human Body*; Treves, *Surgical Applied Anatomy*; Macalister, *A Text Book of Anatomy* (1890); Weisse, *Text Book of Practical Anatomy*; Tillaux, *Anatomie Topographique*; Heule, *Grundriss der Anat. des Menschen*; Hyrtl, *Topographische Anatomie*; Gegenbauer, *Anat. des Menschen*; Rüdinger, *Topograph. Anat.*; Joessel, *Topog. Chirurgische Anat.*; Nuher, *Praktische Anat.*; Roser, *Topograph.-Chirurg.*; also the works by Merkel, Schmidt, Schwalbe, Henke, Hartmann, and Langer.

ANATRON (through Arabic *al natrun* from Gk., *natron*, soda), spume or glass-gall, a scum which rises upon melted glass, in the furnace, and when taken off, becomes liquid in the air, and then hardens into common salt. The term is also applied to the salt which collects on the walls of vaults.

ANAXAGORAS, one of the most eminent philosophers of the Ionic school, was b. at Clazomenæ, in Ionia, 500 B.C. He belonged to a wealthy and distinguished family, which circumstance may have enabled him to devote himself exclusively to intellectual pursuits. Yet he does not seem to have entered into the possession of his property, but left it to his relations. When only 20 years of age, he went to Athens, where, in the course of time, he acquired a high reputation, and had several illustrious pupils, among whom were Pericles, Euripides, Socrates, and Archelaus. But at last, being accused of impiety towards the gods, he was condemned to death. His sentence, however, was commuted into banishment for life, through the eloquence of Pericles. He withdrew to Lampsacus on the Hellespont, where he died in the 73d year of his age. The old man was accustomed to say proudly, in his exile: "It is not I who have lost the Athenians, but the Athenians who have lost me." When on his death-bed, the magistrates of the town asked what funeral honors he desired; "Give the boys a holiday," was the quaint reply of the sage; and for several centuries the day of his death was commemorated in all the schools of Lampsacus.

It is not easy to ascertain what were the opinions of A. in philosophy. Fragments merely of his works have been preserved, and even these are sometimes contradictory. Of one thing we are certain, that he had a deeper knowledge of physical laws than any of his predecessors or contemporaries. The absurdities of opinion which are attributed to him are no proof of the contrary, for, in his time, any attempt to explain even a moderate number of the phenomena of nature was sure to be attended with what every-

body now sees to be extravagant fictions. He believed the heavens to be a solid vault; the stars to be stones thrown up from the earth by some violent convulsion, and set on fire by the ether which ever burns in the upper regions of the universe; the milky-way to be the shadow of the earth; that the soul had an aerial body; that the sun was a burning mass of stone, larger than the Peloponnesus. But he also arrived at some tolerably accurate conclusions regarding the cause of the moon's light, of the rainbow, of wind, and of sound. His great contribution to ancient philosophy, however, was his doctrine as to the origin of all things. He held that all matter existed originally in the condition of atoms; that these atoms, infinitely numerous, and infinitely divisible, had existed from all eternity, and that order was first produced out of this infinite chaos of minutiae through the influence and operation of an eternal intelligence (Gr. *nous*). He also maintained that all bodies were simply aggregations of these atoms, and that a bar of gold, or iron, or copper, was composed of inconceivably minute particles of the same material; but he did not allow that objects had taken their shape through accident or blind fate, but through the agency of this "shaping spirit" or *Nous*, which he described as infinite, self-potent, and unmixed with anything else. "*Nous*," he again says, "is the most pure and subtle of all things, and has all knowledge about all things, and infinite power." A.'s theory is thus only one step from pure theism. He makes the work of the Eternal commence with providence, not with creation.

The fragments of A. have been collected by Schaubach (Leipsic, 1827), and by Schorn (Bonn, 1829).

ANAXARCHUS, of Abdera. He was with Alexander in the Asian expedition, and is supposed to have been a friend and counselor, checking the conqueror's vainglory, and consoling his grief when he had slain Clitus.

ANAXIMANDER, a Greek mathematician and philosopher, the son of Praxiades, and the disciple and friend of Thales, was b. at Miletus 610 B.C., and d. in 546. His principal study was mathematics. He is said to have discovered the obliquity of the ecliptic, and certainly taught it. He appears to have applied the *gnomon*, or style set on a horizontal plane, to determine the solstices and equinoxes. The invention of geographical maps is also ascribed to him. As a philosopher, he speculated on the origin (*arche*) of the phenomenal world, and this principle he held to be the infinite or indeterminate (*to apeiron*). This indeterminate principle of A. is generally supposed to have been much the same with the chaos of other philosophers. From it he conceived all opposites, such as hot and cold, dry and moist, to proceed through a perpetual motion, and to return to it again. Of the manner in which he imagined these opposites to be formed, and of his hypothesis concerning the formation of the heavenly bodies from them, we have no accurate information. It would seem, however, that he did not believe in the generation of anything in the proper sense of the word, but supposed that the infinite atoms or units of which the *arche*, or primary matter, is composed, merely change their relative positions in obedience to a moving power residing in it. Some of his particular opinions were that the sun is in the highest region of the heavens, is in circumference 28 times greater than the earth, and resembles a cylinder from which flow continual streams of fire; that eclipses are caused by the stopping of the openings from which the fire flows; that the moon is also a cylinder, 19 times greater than the earth; and that the moon's phases are caused by obliquity of position, and eclipses by complete turning round. He taught that the earth is of the form of a cylinder, and that it floats in the midst of the universe, that it was formed by the drying up of moisture by the sun, and that animals are produced from moisture.

ANAXIMENES, a Greek philosopher, b. at Miletus, flourished about 556 B.C. He held *air* to be the first cause of all things, or the primary form of matter, from which all things are formed by compression.

ANAXIMINES, a Greek historian, b. in Lampsacus, Asia Minor. in the 4th c. B.C.; a pupil of Zoilus and Diogenes; said to have taught Alexander rhetoric, and to have accompanied him in the Persian expedition. He wrote histories of Philip of Macedon, of Alexander, and of Greece, of which a few fragments exist.

ANBURY, a disease to which turnips are liable, and which often proves of serious importance to farmers, destroying the crop of entire fields. It is sometimes called *club-root*, because of the knobs or tubercular excrescences which form upon the root. The root, instead of swelling into one turnip of good size, generally becomes divided into a number of parts, each in some small degree swelling separately by itself; whence the popular name, *fingers and toes*. See **TURNIP**.

ANCACH', the n. w. department of Peru, between the Andes and the Pacific; about 17,405 sq. miles; pop. about 284,000; productive in cereals, sugar, and cotton. Marble and minerals abound. The capital is Huaras, in an extensive and populous valley. Other cities are Huaylas, Santa, Huari, Cajatambo, Panabamba, and Fallaca, each the capital of a province of the same name. Through the passes in this department the Colombian army of the war of independence made its wonderful march to fall upon the Spanish forces at Junin.

ANCASTÉ, a t. of the Argentine Republic, S. A., in the province of Catamarca, 23 m. n.e. from Catamarca. Pop. about 8000.

ANCELOT, JACQUES-ARSENE-POLYCARPE-FRANÇOIS, a French poet, b. Feb. 9, 1794, at Havre, where his father was clerk of the chamber of commerce. The latter being a well-informed gentleman, delighting in verse, early taught his son to recite passages from the French poets. A. was from the first intended for active life in connection with the administration of the navy; and was employed, until the revolution of July, in the government service. His reputation was first established in 1819 by his tragedy of *Louis IX.*, which was played fifty nights in succession, and procured him a pension of 2000 francs from the king. His next piece, *The Mayor of the Palace* (1823), was not so well received. In 1824, appeared his *Fiesque*, a work which exhibited the great skill of the author in adapting a masterpiece of Schiller to the French stage. In 1825, he gave to the world an epic poem in six cantos, *Marie de Brabant*; and in 1827, a clever and graceful work, partly prose and partly verse, entitled *Six Months in Russia*; besides a novel in four volumes, *The Man of the World*. *Olga*, a drama, was published in 1828; and *Elizabeth of England* in 1829. Both of these works were highly successful, though neither met with the brilliant reception of *Louis IX.* In 1834 appeared *Les Emprunts aux Salons de Paris*. The revolution of July deprived him of his pension, and also of his situation as librarian of Meudon; and for the next ten years he was compelled to support himself and family by the concoction of numberless *vaudevilles*, dramas, comedies, anecdotes, etc., sometimes of very questionable morality. In 1841, the French academy chose him as the successor of Bonald. Shortly after appeared his *Familiar Letters* (*Épîtres Familières*), a collection of satires as remarkable for freshness of epigram as for grace of style and richness of versification. In 1848, he published *La Rue—Quincampoix*. He died Sept. 7, 1854.

A's *chef-d'œuvre*, *Louis IX.*, is a work of genius; the versification is correct, elegant, and harmonious; the manners and characters of the period are delineated with great fidelity and brilliancy; the plot is skilfully constructed; and some of the scenes are contrived with singular felicity.

ANCELOT, MARGUERITE LOUISE VIRGINIE CHARDON, 1792–1875, a French novelist and dramatist, wife of Jacques A. She greatly aided her husband in his dramas, and produced several comedies of her own, in all 20 plays, besides many novels which were popular. She was also an amateur painter. In 1828 she exhibited *Un Lecture de M. AnceLOT*, which was much talked about for its portraits of Parisian celebrities.

ANCESTORS, WORSHIP OF, the chief element in the religions of perhaps the larger portion of mankind. It arises naturally from the primitive conception of a soul animating the body and exercising influence over it, and after death retaining its power, continuing into the unseen world the life and social relations of the living world. The dead chief now passes into a deity, goes on protecting his clan and receiving service from it, and continues to keep the same temper as in life, so that it is not mere family affection but actual fear that impels this reverence among the North American Indians, the Ancient Aztecs, the Negroes in Guinea, the natives of Polynesia, and especially among the Zulus, who conquer in battle with the help of the "amatongo," the spirits of their ancestors.

The worship of Ancestors is really a subdivision of animism (q.v.). The spirits of the dead are assimilated to the spirits that reside in the objects of nature, at first revered like them, then more than them. Where direct worship of the objects of nature unfolds itself into a rich mythology, as among races highly endowed with the speculative and æsthetic faculties, such as the ancient Greeks, animism and the worship of ancestors develop but feebly. But where, as in China, mythology remains barren, or where, as among savages, it never gets beyond the embryonic stage, there animism prevails, and along with it the worship of ancestors. In China it is the dominant religion. Ancestors have their temples and their offerings, and remain so present that the virtues or the crimes of their descendants are always considered in relation to them, as covering them with honor or infamy. The Hindu pays his offerings to the *pitris* or divine manes, and looks to them for success and happiness. In Europe the most conspicuous example was the usage of the ancient Romans, whose *manes* or ancestral deities were embodied as images, set up as household patrons, and appeased with offerings. They were counted among the gods of the lower world, and tombs were inscribed D. M. "Diis Manibus." The universality of ancestor-worship has led Herbert Spencer to the opinion that it was the origin of religion everywhere. His view is a kind of revival of the old Euhemerism (q.v.). He argues that all religious beliefs arose out of the erroneous conclusions drawn by primitive man from the ill-understood facts of his own nature, especially in the phenomena of sleep and dreams. These have to the savage as much objective reality as those he sees when awake. This primitive conception finds support in the facts of syncope, apoplexy, catalepsy, and other forms of temporary insensibility. During these his "double," the soul, has, he believes, been actually absent from the body. These ideas applied to death, which is merely a lengthened sleep or prolonged absence, have engendered the idea of an awakening following regularly after death. Hence, primitive funeral rites assume that the dead can eat, drink, and fight anew, and act in everything like a living man. Upon this conception of the state of the dead, in Spencer's

view, the savage man's idea of another life is grafted. A future life assumes another world, a region of souls, located at first near the place of burial, afterwards above, below, and around the living world. These disembodied souls are ordinarily invisible, but are able to manifest themselves from time to time. Hence arises, naturally, the idea that things extraordinary or exceptional are caused by the action of the dead spirits. Since these disembodied spirits still continue influential for good or evil, it is wise to conduct ourselves in such a way as to conciliate their good-will and to deprecate their wrath.

This argument, however, fails to account for many of the facts, and its fundamental negation may be questioned, that primitive man is incapable of taking the inanimate and impersonal for the animate and the personal. He forgets that the savage man is full of imagination, and that he is constantly personifying. Mr. Spencer's theory does not explain the analogies between myths among races of the most widely different degrees of civilization, nor the difference in the degree of divinity between the first and later ancestors, nor why the dead man has more power for good or evil than he had when alive. See Tylor's *Primitive Culture*; Herbert Spencer's *Principles of Sociology*; Caspari, *Die Urgeschichte der Menschheit*.

ANCHISES, in legend, the son of Capys and Themis, the founder of Ilium; from many indications supposed to have come from Assyria. Venus was enamored of his beauty, and by him became the mother of Æneas, whose maternity A. was not to disclose; but he did so, and was killed by a bolt from Jupiter—some say only blinded. His son bore him on his shoulders, fleeing at the destruction of Troy, and he is heard of in Italy, Sicily, and elsewhere. There was a grave on Mt. Ida said to be his, and he had a sanctuary at Eggesta, in Sicily.

ANCHITHE RIUM, an extinct quadruped of the miocene, now thought to represent a genus distinct from but analogous to the horse. The shaft of the ulna is complete and separate from the radius; the fibula and tibia are attached; the short crowns of the molars lack cement, and the teeth are inserted by distinct fangs. The foot has three digits, the middle being largest, and all reach the ground.

ANCHOR. A device for securing a vessel to the ground under water by means of a cable. Many forms of anchor were made by the ancients; some were merely large stones, others crooked pieces of wood weighted, to make them sink in the water, the earlier ones acting mainly as weights and holding the vessel by their own inertia instead of hooking into the ground. The Greeks are credited with having used the first *iron* anchor. As originally made the anchor had only one fluke, or arm, for penetrating the ground, but a second was afterwards added; it had no stock, or transverse piece, and was on that account ill suited for insuring a firm grip into the ground when lowered. The Greek vessels had several anchors, one of which, called the "sacred anchor," was never let go until the ship was in dire distress. The number of working anchors furnished both men-of-war and merchant vessels is two, called the starboard and port bowers; if one should be somewhat heavier than the other, it is sometimes designated as the best bower. In addition there are other anchors called sheet-anchors, which are generally somewhat heavier than the bowers, and are only used in cases of emergency. The smaller anchors are known as stream anchors, kedges, and grapnels, or boat anchors. Anchors are generally made of iron, and consist of a strong *shank* or main supporting piece, at the upper end of which is a *ring* or shackle, and just below the ring a transverse piece called the *stock*; the other extremity is called the *crown*, from which branch out two *arms* or *blades* in directions making a right angle to that of the stock; each arm spreads out into a broad *palm* or *fluke*, the sharp extremity of which is called the *peak* or *bill*. All of these parts bear special relation to the fast-holding of the anchor in the ground. When the anchor is let go from the cat-head the crown first strikes the bottom; it then falls over in such a manner that one end of the stock rests upon the bottom, and the subsequent movements of the ship and the cable cause one or other of the flukes to dig vertically into the bottom and maintain a firm hold. On the firmness of this gripe depends the safe anchoring of the ship, and the sizes of all the different parts of the anchor, as well as the curve of the arms and flukes, are calculated with direct reference to this condition. The most favorable angle between the face of the flukes near their extremities and the shank has been found to be about 45°, that is, the planes of the two flukes should lie approximately at right angles to each other. The manufacture of anchors furnished, until steam hammers came into use, the most formidable exemplification of smith's work anywhere presented on account of the great dimensions and weight of iron which had to be welded into one mass. The anchor-smiths wielded the most ponderous sledge-hammers known to our artisans, and the services of a large number were needed to weld the metal while in the heated and yielding state.

The government anchor shops are now located at the navy-yard, Boston, Mass., where the cables are also made. Many improvements and novelties in the shape and construction of anchors have been introduced in recent times. The stock, formerly of wood, gave way to iron, and that in turn has, in some patent anchors, been entirely removed. The principal names connected with the newer types are those of Lieut. Rodgers, who introduced the hollow-shanked anchors, with the view of increasing the strength without adding to the weight; Mr. Porter, who made the arms and flukes

movable by pivoting them to the shank, instead of fixing them immovably, causing the anchor to take a readier and firmer hold and avoiding the danger of fouling the cable; Mr. Trotman, who has further improved Porter's invention, and M. Martin, whose anchor is of very peculiar form, and is constructed so as to be self-canting, the arms revolving through an angle of 30° either way, and the sharp points of the flukes being always ready to enter the ground; the stock is also bent and adds considerably to the resistance of the anchor. Tyzack's anchor has only one arm, pivoted on a bifurcation of the shank and arranged to swing between the two parts. Mitchell's screw-anchors are very powerful screws made use of for mooring purposes. They have a broad flange nearly four feet in diameter which, when entered into the ground, presents a resistance equal to that of ten square feet. This is not much greater than that of an ordinary anchor, but the screw type is less liable to be fouled by other ground tackle.

The Inglefield and Lenox patent double-holding anchor, which has been approved by the English Admiralty for use in the naval service, was invented with the special object of supplying all descriptions of vessels with an anchor on the "two-arm-holding" principle, which may be relied upon for quick and efficient holding at both long and short scope of cable in all kinds of anchorage. The great improvement in this anchor lies in the construction and position of the canting or tipping piece. This is placed beyond instead of under the head of the anchor, consequently the anchor cannot rest upon it; but it depresses the arms, bringing them into position to take the ground not only by their own weight, but by the whole weight of the anchor. Should the anchor be let go in soft ground into which it could sink rapidly, leaving the arms or flukes in an upward position, as soon as a strain came upon the cable it would be imparted to the shank, the first movement of which would cause the arms to fall and take firm hold of the ground. These anchors stow flat on vessels' bows, clearing the prows of iron-clad rams; there is no possibility of the cable fouling; they are certain of holding, and of comparatively cheap construction. They can also be used without a stock so as to draw up to the hawse-hole if desired. A stockless anchor, known as the Dunn anchor, designed by Lieutenant Dunn of the U. S. Navy, is being quite generally used by the new men-of-war. It is made of cast steel and has only three principal parts—the *shank*, the *pin*, and the *combined crown and flukes*. These last rotate on the pin joining them to the shank head, and are so constructed that if the pin breaks the anchor will still hold and perform its functions, while the shank cannot draw out and the anchor be lost in consequence. When let go from a ship the anchor on striking the bottom "bites" immediately after strain is brought upon the chain, irrespective of the position in which it strikes, owing to the shape of its crown. Having no stock, and both flukes engaging at once, it can never foul the chain, nor is it possible for the ship in shoal water to ground on her own anchor, an accident not uncommon with older types. There is no stock, so that the anchor can be hove up snugly into the hawse-pipe. It can stow on the rail if vessels are not fitted for carrying it in the hawse-pipe, and while there presents no protruding arms or other parts likely to foul ropes or interfere with firing the guns. It is also lighter than other types of equal efficiency. A *floating*, or *sea-anchor*, is an apparatus variously constructed, designed to be sunk below the swell of the sea where there is no anchorage to prevent a vessel from drifting. A *mooring anchor* is a large heavy mass, usually of iron, placed at the bottom of a harbor or roadstead for the purpose of securing a buoy or of affording safe and convenient anchorage to vessels. In the latter case a floating buoy, to which a ship may readily and speedily be secured by a cable, is fastened to it by a chain. A *mushroom anchor* is an anchor with a saucer-shaped head on a central shank used for mooring. Mushrooms are also used without a shank, the cable ring being on the outer portion or crown of the saucer, so that when on the bottom the suction added to the weight gives additional holding power. An anchor is said to be *foul* when the cable is wound around it; *cockbilled*, when suspended vertically from the cat-head; *apeak*, when the cable is so tight that the anchor is under the ship; *atrip* or *aweigh*, when it is just pulled out of the holding ground, and *awash* when the stock is hove up to the surface of the water, a term applied to the iron and masonry used in holding the ends of the cables of suspension bridges and other similar structures.

ANCHORAGE—ANCHOR-GROUND. The terms in general mean that portion of a harbor or roadstead best suited for anchoring vessels. It is marked on the charts with an anchor, so that a stranger on first entering will know where to find the best holding ground for his anchors. The matter is generally in charge of an official known as the harbor master. The anchorage of vessels in the port of New York was made a matter of congressional action and has been placed in the hands of the officers of the Revenue Marine, who are empowered and directed in cases of necessity, or when proper notice has been disregarded, to use the force at their command to remove from the channels any vessel found violating the rules. The owner, master, or person in charge of such offending vessel is liable to a penalty of one hundred dollars, which if not paid renders the vessel liable to seizure. There are anchorages for vessels in the East river, Hudson River, Upper Bay, off Governor's Island, Staten Island, and in Sandy Hook bay, which are well defined and leave ample room about the pier-heads, ferry-slips, and places frequented by excursion steamers. Points where cables and water-pipes cross are clearly

marked, so that vessels will not interfere with them. The dumping of ashes from scows is not allowed, excepting outside of certain limits, and the direction of such matters is in charge of a naval officer whose title is Supervisor of the Port.

ANCHORITES, or **ANCHORETS** (Gr. *anachorētai*; literally, persons who withdraw from society), the hermits who began to appear in the Christian church in the 3d c., living in solitude, and not, like the monks or cenobites, in communities. During the first two centuries, Christians generally thought it enough to withdraw from the world by refusing to participate in heathen festivals and amusements; but extreme views became gradually prevalent, and were connected with a belief in the merit of celibacy, of abstinence from particular kinds of food, of self-inflicted tortures, etc. The persecutions to which Christians were subjected, drove some into the solitude of deserts; afterwards, the glory of a life spent in loneliness and austerity became a substitute for that of the martyr's death. The general corruption of society also caused many earnest and well-meaning persons to shun it; the Ascetics (see **ASCETICISM**) set the example of retiring from cities to rural districts and villages; the A. went further, and sought to withdraw themselves altogether from mankind; and if the reputation of sanctity which was connected with a life of solitude constituted its chief attraction to some, there can be no doubt that many chose it in the hope of thereby attaining to real sanctity. Many of the A. voluntarily subjected themselves to the vicissitudes of the weather, without proper habitation or clothing, restricted themselves to coarse and scanty fare, wore chains and iron rings, and even throughout many years maintained painful postures, such as standing on the top of a pillar (see **PILLAR SAINTS**), thus displaying an earnestness which greater enlightenment might have advantageously directed to the good of mankind. Saint Antony (q.v.) was one of the first and most celebrated A. The A. were not always able to preserve their solitude unbroken. The fame of their sanctity drew many to visit them; their advice was often sought; and the number of their visitors was much increased by the belief that diseases, particularly mental diseases, were cured by their blessing. Sometimes, also, they returned for a short time to the midst of their fellow-men to deliver warnings, instructions, or encouragements, and were received as if they had been inspired prophets or angels from heaven. The number of A., however, gradually diminished, and the religious life of convents was preferred to that of the hermitage. The western church, indeed, at no time abounded in A. like the eastern, and perhaps the reason may in part be found in the difference of climate, which renders a manner of life impossible in most parts of Europe that could be pursued for many years in Egypt or Syria.

ANCHOR WATCH, a portion of the watch constantly on deck while the ship is at single anchor, ready to attend to the anchor, let go another, set head-sails, and the like, as required.

ANCHOVY, *Engraulis enchrasicolus*, a small fish, about a span long, much esteemed for its rich and peculiar flavor. It is not much longer than the middle finger, thicker in proportion than the herring, to which it has a general resemblance; the head is sharp-pointed, and the under jaw much shorter than the upper; the scales large, silvery, and easily removed, the tail deeply forked. It is occasionally found on the British coasts, and is said to be not at all uncommon on the coast of Cornwall in the latter part of summer and beginning of autumn. It would seem to have been formerly more abundant than it now is in the British seas, as several acts of parliament, of the reign of William and Mary, regulated the A. fisheries. It occurs on the coasts of the Baltic and of Greenland, and abounds in the Mediterranean and on the Atlantic coasts of Spain, Portugal, and France, where extensive and very productive fisheries are carried on, particularly in the months of May, June, and July, when the shoals of anchovies leave the deep seas, and approach the shores for the purpose of spawning. They are fished during the night, and are attracted to the boats by fires. They are salted in small barrels, and are much used for sauces, etc. The Romans made from them a highly valued sauce called *garum*.—*Sardines* (q.v.) are often sold as anchovies.—The genus *engraulis* belongs to the *clupeidae*, the herring family, and it was formerly included in *clupea*. Three species are found in North American Atlantic waters, and four on the Pacific side. All the species are small, and most of them tropical. *E. brownii* is used for making a delicious condiment called *red fish* in India.

ANCHOVY PEAR, *Grias cauliflora*, a tree, the only known species of a genus somewhat doubtfully referred by Lindley to his order *barringtoniaceæ* (more generally regarded as a sub-order of *myrtaceæ*, q.v.). It grows in boggy places in the mountainous districts of Jamaica and other West Indian islands, attains a height of 50 ft., and has great oblong leaves 2 or 3 ft. in length. The flowers are numerous, on short peduncles, large and whitish, the corolla consisting of four petals, and the calyx 4-cleft. The fruit is an ovate drupe, crowned with the persistent calyx, the stone marked with eight ridges. This fruit is pickled and eaten like the East Indian mango, which it much resembles in taste.

ANCHUSA. See **ALKANET**.

ANCHYLOSIS. See **ANKYLOSIS**.

ANCIENNE LORETTE, a Canadian village, 7 m. w.s.w. of Quebec; pop. est. 2500; the last refuge of the Huron Indians after their defeat at lake Huron in 1650. A remnant of the race still exists in the village.

ANCIENT ORDER OF HIBERNIANS. See ASSOCIATIONS, SECRET AND BENEVOLENT

ANCIENTS, COUNCIL OF, one of the two assemblies composing the French legislature in 1795-99. There were 250 members, none less than 40 years old. It was dissolved at the overthrow of the directory by Napoleon.

ANCIL'LOIN, a French family who, after the revocation of the edict of Nantes, migrated from Metz into Prussia.—**DAVID A.** studied theology at Geneva, was afterwards pastor of the French Reformed colony at Hanau, and d. in Berlin in 1692.—**CHARLES**, son of the former, was b. at Metz, July 28, 1659, and d. in Berlin, July 5, 1715. He is known by his writings: *L'Irrévocabilité de l'Edit de Nantes* (1688), and *Histoire de l'Etablissement des Français Réfugiés dans les Etats de Brandebourg* (1690).—**LOUIS FREDERICK**, grandson of Charles A., was b. in Berlin 1740, and d. there as pastor of the French congregation in 1814. His son **FREDERICK**, who rose to be a minister of state in Prussia, was b. in Berlin, April 30, 1767. In 1792, he was appointed professor of history in the military academy of Berlin, and afterwards royal historiographer, a post to which he had recommended himself by his work, *Tableau des Révolutions du Système Politique de l'Europe depuis le 15^{me} Siècle* (4 vols., Berlin, 1803-1805). In 1814, he took an administrative post under Hardenberg, and, in 1818, held a very prominent position under Count von Bernstorff. In 1830, when the July revolution occurred in France, he assisted the measures of king Frederick William III. for the preservation of peace in Europe. While, like the politicians of Austria, he argued that "all should be done for the people, but nothing by the people," he also contended for the necessity of progressive reforms in legislation, in order to prevent all violent collisions between government and popular opinion. His private life was simple and unostentatious. Though thrice married, he left no children. A. d. April 19, 1837. His various writings on politics, philosophy, and literature are chiefly devoted to an exposition of the principles by which he was guided as a statesman.

ANCK'ARSTROEM. See ANKARSTRÖM.

ANCON (Gk., the bent arm), as a term of anatomy, denotes the *olecranon* or elbow, the larger posterior process at the upper end of the ulna. The term has other applications, e. g., it is applied to an elbow or angle or corner-stone, or to the corners or quoins of walls, cross-beams, or rafters. It denotes also a bracket supporting a cornice as of doorways, frequently used merely as an ornament, as on the keystone of an arch, and called also console (q. v.).

ANCONA, a province of Italy, bounded on the north by the Adriatic Sea and the province of Pesaro-Urbino, on the south by Macerata, and on the east by the Adriatic. Its surface is mountainous. Its area is 762 sq. m., and its estimated pop. in 1894 was 273,941.

ANCONA, the capital of the province in Italy, of the same name, lat. 43° 38' n., and long. 13° 35' e. It is situated on a promontory of the Adriatic coast, and, rising in the form of an amphitheater, presents a picturesque appearance from the sea. It is the seat of a bishop, and contained (1893) 55,000 inhabitants. The harbor was greatly improved in 1887, and is now available for large vessels. It is enclosed by moles and defended by forts. The commerce is much less considerable than it once was, though, in that respect, it is still one of the most important places on the Adriatic. Corn, and woolen and silk goods, oils, sulphur, alum, fruits, etc., are the chief exports. It manufactures flour, macaroni, ships' rigging, tobacco, and leather. A mole of 2000 feet in length, built by the emperor Trajan, and a triumphal arch of the same emperor are the most notable monuments of antiquity. There are some fine public buildings. One of the most venerable of these is the cathedral of St. Cyriac, built in the 10th c., and possessing the oldest *cupula* in Italy. But the houses are in general mean, and the streets narrow. A. is supposed to have been founded by Syracusans who had fled from the tyranny of Dionysius the elder. It was destroyed by the Goths, rebuilt by Narses, and again destroyed by the Saracens in the 10th century. It afterwards became a republic; but in 1532 Pope Clement VII. annexed it to the states of the church. In 1798 it was taken by the French, but in 1799 Gen. Meunier was obliged to surrender it to the Russians and Austrians after a long and gallant defence. Since 1815 the citadel has been the only fortification. When the Austrian troops in 1831 occupied the Roman frontiers, whose inhabitants were then in a state of insurrection, the French ministry determined to neutralize the influence of Austria. A French squadron appeared before the harbor, and landed 1500 men, who took possession of the town on the 22d Feb., 1832, without any resistance, the citadel capitulating on the 25th. It remained in their hands till 1838, when both French and Austrians retired from the Papal states. In 1849 a revolutionary garrison in A. capitulated after enduring a siege by the Austrians of 25 days.

ANCONA, **ALESSANDRO D'**, Italian philologist and critical writer, born in Pisa, 1835. He was active in politics during the exciting period which preceded the war of Italian independence, but after the peace of Villafranca he retired from political life. He wrote many works, among which may be mentioned *The Precursors of Dante* (1874), *Origins of the Theatre in Italy* (1877), *Italian Popular Poetry* (1878), and other works on Italian literature and Romance philology.

ANCONA, CIRIACO, an Italian traveler; b. 1390; d. 1450.

ANCONNE. See ANCON.

ANCONOID. A mathematical term applied to a process of the cubit.

ANCON SIN SALIDA. A deep narrow bay which stretches across the southern extremity of the Andes from the Pacific.

ANCONY. A technical term of iron manufacturing, applied to a bar of half-wrought iron.

ANCO'RA (Italian). The same as the French word *encore* (again), and used in demanding the repetition of a song, for which, however, the French use the word *bis* (twice).

AN'CRE, CONCINO CONCINI, BARON DE LUSSIGNY, Marshal d', a Florentine by birth, who came to the French court in the year 1600, with Maria de' Medici, the wife of Henry IV., and along with his wife, Eleonora Galigai, exercised an unhappy influence in promoting the disagreement between the king and queen. When, after Henry's death, the queen became regent, Concini, as her favorite, obtained possession of the reins of government; and in 1613, was made a marshal and prime minister. He purchased the marquise of Ancre in Picardy, and took his title from it. He became an object of detestation equally to the nobility and the people. A conspiracy was formed against him, to which the young king Louis XIII. was himself privy—De Luynes the king's worthless favorite, being one of the conspirators—and he was assassinated in the Louvre in open day, on the 24th of April, 1617. His body was privately buried, but was soon disinterred by the populace, dragged through Paris, and burned before the statue of Henry IV. His wife was soon afterwards accused of witchcraft, which she sarcastically repudiated, saying that the only sorcery she had employed to influence the queen was "the power of a strong mind over a weak one." The sneer, however, did not save her. She was executed, and her son, deprived of rank and property, was driven from the country.

ANCRUM MOOR, England, 5½ miles northwest of Jedburgh (q.v.), was in 1544 the scene of the defeat of 5000 English under Sir Ralph Evers and Sir Brian Latoun, by a Scottish force under the Earl of Angus and Scott of Buccleuch. A defaced monument marks the spot where a Scottish maiden, named Lilliard, is said to have done prodigies of valor.

ANCUS MARCIUS, son of Pompilia, daughter of King Numa Pompilius, was the fourth king of Rome. Following the example of his grandsire, Numa, he endeavored to restore the almost forgotten worship of the gods and the cultivation of the arts of peace among the Romans. But, despite his inclination for peace, he was engaged in several wars with the neighboring Latin tribes, whom he subdued and reduced to order. These Latins, Niebuhr considers to have formed the original *plebs*. Against the Etruscans he fortified the Janiculum, connected it with Rome by a wooden bridge, and gained possession of both banks of the Tiber, as far as its mouth, where he founded Ostia as the port of Rome; he dug what was called "the ditch of the Quirites"—a defense for the open space between the Cælian hill and Mt. Palatine; and built the first Roman prison of which we read, a proof that civilization had really commenced, inasmuch as offenses then formally ceased to be regarded as private and personal matters, and were treated as crimes against the community. He d. in 614 B.C., after reigning twenty-four years.

ANCYLUS. A genus of small fresh-water gasteropodous mollusks found in the lakes and streams of the United States and Canada.

ANCY'RA. See ANGORA.

AN'DA, a genus of plants of the natural order *euphorbiaceæ*, the only species of which, *A. brasiliensis*, is a Brazilian tree, with large yellow flowers, and an angular fruit about the size of an orange, containing two roundish seeds, like small chestnuts. The seeds are called in Brazil *purga dos paulistas*, are much used medicinally in that country, and are more purgative than those of the castor-oil plant. This quality seems to depend upon a valuable fixed oil, of which twenty drops are a moderate dose. It is obtained by pressure. The bark of the tree, roasted in the fire, is accounted in Brazil a certain remedy for diarrhea, brought on by cold. The fresh bark, thrown into ponds, is said to stupefy fish.

ANDBATISM, a term derived from the Latin *andabata*, a gladiator whose helmet was without openings for the eyes, meaning literally, therefore, blind, uncertain fighting, but applied to doubt or uncertainty in general, or to wild, uncertain argument.

ANDALU'SIA, or **ANDALUCIA**, a large and fertile region in the south of Spain, lying between 36° 2' and 38° 39' n. lat., and 1° 38' and 7° 20' w. long. Having been overrun by the Vandals, it is supposed by some that they gave it the name of Vandalucia or Andalucia; but the real origin of the name is probably *Andalosh*, the land of the west. It is the *Tarshish* of the Bible, and was called Tartessus in

ancient geography. The Romans named it *Bætica*, from the river *Bætis* (the modern Guadalquivir). The Moors founded here a splendid monarchy, which quickly attained a high degree of civilization. Learning, art, and chivalry flourished in harmony with industry and commerce. The four great Moorish capitals were Seville, Cordova, Jaën, and Granada. During the darkness of the middle ages, Cordova was "the Athens of the west, the seat of arts and sciences;" and later still, under the Spaniards, when "the sun of Raphael set in Italy, painting here arose in a new form in the Velasquez, Murillo, and Cano schools of Seville, the finest in the peninsula." On the n., A. is divided from Estremadura and New Castile by the mountain-chains of Aroche, Cordova, and Morena. On the e. it is bounded by Murcia, and on the w. by Portugal and the Atlantic. The s. coast eastward from Gibraltar is mountainous; the w., where the Guadalquivir flows into the Atlantic, is level. A. was esteemed the richest district of Hesperia, and its former wealth of produce has been indicated by such names as the "garden," the "granary," the "wine-cellar," and the "gold-purse" of Spain. But, in the present day, such predicates are merited only by comparatively small portions of the hilly country on both sides of the Guadalquivir, where, even with careless cultivation, the soil is luxuriantly productive. Here wheat and maize ripen in April, and yield abundantly. Olives and oranges attain their greatest height, and vegetation generally assumes a tropical character. Cotton, sugar-cane, Indian figs, and batatas flourish in the open air, and the cactus and aloe form impenetrable hedges. Wine and oil abound. The botany and mineralogy of A. are very rich. The ranges of the Sierra Nevada are composed principally of primary and secondary formations. In the w., towards Xenil, cultivation is more sparing, as there is a natural deficiency of water, and the artificial means of irrigation formerly employed have fallen into disuse. Nearer to the coast lie tracts of land still more barren; and the level strip extending between the mouths of the Guadalquivir and the Tinto is covered with moving sands. On the whole, A. is still one of the most fertile districts of Spain, owing to its delicious southern climate and the abundance of water supplied by its snowy mountains. Its breed of horses has long been celebrated, and the mules are superior to those of other countries. The Sierra Morena mountains supply the wild cattle exhibited in the bull-fights of Madrid. The natural riches of the district have at various times invited colonists and invaders, such as the Phœnicians and the Moors. The Andalusians are regarded as among the most lively, imaginative, and active people of Spain. But they are also considered by the rest of their countrymen to be the Gascons—the braggarts and boasters of Spain. Apparently they have never at any time been warlike, since even Livy calls them *imbelles*. They are, like all braggarts, extremely credulous, and are, besides, remarkable for their intense superstition. The worship of the Virgin prevails to such an extent that the very country is called "the land of the most holy Virgin." They speak a dialect of Spanish mixed with Arabic. A. is divided into the provinces of Almeria, Jaën, Malaga, Cadiz, Huelva, Seville, Cordova, and Granada. The chief towns are Seville, Cordova, Jaën, Cadiz (q. v.).

ANDALU SITE, an anhydrous silicate of alumina, occurring in four-sided prisms, distinguished from feldspar by being harder and less fusible. A variety called *chiastolite* is found in abundance at South Lancaster, Mass.

ANDAMANS, a group of thickly-wooded islands towards the e. side of the bay of Bengal, between 10° and 14° of n. lat., and about 93° of e. long. The population is both barbarous and scanty, and bears no resemblance whatever either in physical features or language to the neighboring Asiatic races. In 1793 the Great Andaman received a British colony, which was withdrawn, however, in 1796. Since 1857, the A. have been a penal settlement for sepoys mutineers and other criminals. In 1872, lord Mayo, governor-general of India, was assassinated here by one of the convicts. It is physically, however, that the A. deserve mention, not for anything in themselves, but from their being a portion of the long arch, mostly volcanic, of the Indian archipelago, which, with Timor at its bend, comprises the Moluccas, Celebes, the Philippines, and Formosa, on the one side; and on the other side the Sunda isles, Java, Sumatra, the Nicobars, and the A.—the outline only requiring to be filled up in imagination, in order to produce a peninsula harmonizing more or less with the other southern projections of the world, Hindostan, Africa, and South America.

ANDANTE (Italian), in music, implies a movement somewhat slow and sedate, but in a gentle and soothing style. This term is often modified, both as to time and style, by the addition of other words—as *A. affettuoso*, slow, but pathetically; *A. cantabile*, slow, but in a singing style; *A. con moto*, slow, but with emotion; *A. grazioso*, slow, but gracefully; *A. maestoso*, slow, with majesty; *A. non troppo*, slow, but not too much so; *A. pastorale*, slow, and with pastoral simplicity.

ANDELYS, LES, a t. in the department of Eure, France, 20 m. n.e. of Evreux. It consists of Grand and Petit A. The former dates from the 6th c., and has a collegiate church with wonderful stained-glass windows. Petit A. clusters around château Gail lard, built by Richard Cœur de Lion in 1195, and once one of the strongholds of France. The chief trade is in cloth. There are thread and leather manufactures. Pop about 4000.

ANDENNES, a t. of Belgium, in the province of Namur, 10 m. e. from Namur, and nearly 2 m. s. from the Maas. It has manufactures of paper, porcelain, and tobacco-pipes, for the last of which it is particularly famous. Cotton-spinning, bleaching, and other branches of industry are also prosecuted. There are beds of pipe-clay, quarries of marble, and lead, iron, and coal mines in the neighborhood. Pop. about 7000.

ANDERAB', or **INDERAB**, a t. in the Afghan portion of Turkestan, on the northern slope of the Hindu Kush mountains, and on the right or northern bank of the Anderab or Inderab river, a branch of the Ghori or Kunduz, itself a branch of the Jihun, 80 m. s.s.e. from Kunduz. It is surrounded by gardens, orchards, and vineyards. It is a principal *entrepôt* of commerce between Persia and India. Pop. supposed to be about 6500.

ANDERLECHT, a t. in Belgium, 2 miles s. of Brussels; pop. 32,200. Here, Nov. 13, 1792, Dumouriez defeated the Austrians.

ANDERLO NI, **FAUSTINO**, 1766-1847; an engraver of Padua. Among his works are a portrait of Herder, a Magdalen after Correggio, and a Holy Family, after Poussin.

ANDERLO NI, **PIETRO**, 1784-1849; brother of Faustino; an Italian engraver, pupil of his father, and director of the Longhi school in Milan. His best pieces are "The Woman taken in Adultery," after Titian; "The Virgin," after Raphael; "Moses and Jethro's Daughter," after Poussin, and portraits of Da Vinci, Canova, and Peter the Great.

ANDERNACH, a little t. belonging to the district of Coblenz on the Rhine, in lat. 50° 27' n., long. 7° 25' e., was once a Roman fortress styled Antunnacum, then a residence of the Merovingian kings, and afterwards became one of the most flourishing places on the Rhine. The great tower on the n. side, the fine old church—with one tower built in the Carolingian times—and the old gates and walls, give quite a mediæval aspect to the town. It now contains about 5300 people, supported by trade in leather, wine, and corn, and is especially celebrated for its millstones, exported to distant parts of the world, and for its *tuffstein* or trass, an indurated volcanic mud, which, when pulverized and mixed with lime, makes a mortar or cement for constructions under water.

ANDERSEN, **HANS CHRISTIAN**, one of the most gifted poets that Denmark has recently produced, was b. April 2, 1805, at Odense in Funen. His father was a poor shoemaker, who used, however, to console himself by speaking of the former prosperity and wealth of his family. After his father's death, he was for a short time employed in a manufactory. The widow of Bunkefod, a poet of some reputation, charitably adopted him. He early displayed a talent for poetry, and was known in his native place as "the comedy-writer." Hoping to obtain an engagement in the theater, he went to Copenhagen, but was rejected because he was too lean. He was next encouraged to hope for success as a singer; but had hardly commenced his musical studies when his voice failed. He found generous friends, however, to help him in his distress; and application having been made by one of them to the king, he was placed at an advanced school at the public expense, and so began his academic education in 1828. Some of his poems, particularly one entitled *The Dying Child*, had already been favorably received, and he now became better known by the publication of his *Walk to Amak*, a literary satire in the form of a humorous narrative. In 1830, he published the first collected volume of his *Poems*, and in 1831 a second, under the title of *Fantasies and Sketches*. His *Traveling Sketches* were the fruit of a tour in the north of Germany. He completed his *Agnes and the Mermaid* in Switzerland; and one of his best works, *The Improvisatore*, a series of scenes depicted in a glowing style, and full of poetic interest, was the fruit of a visit to Italy. Soon afterwards, he produced *O. T.* (1835), a novel containing vivid pictures of northern scenery and manners, which was followed (1837) by another, entitled *Only a Fiddler*. In 1840, he produced a romantic drama, entitled *The Mulatto*, which was well received; but another drama, *Raphaella*, was less successful. In the same year appeared his *Picture-book without Pictures*, a series of the finest imaginative sketches. In the end of 1840, he commenced a somewhat lengthened tour in Italy and the east, of which he gave an account in *A Poet's Bazaar* (1842). In 1844, A. visited the court of Denmark by special invitation, and in the following year he received an annuity. After that date he traveled much, visiting England as well as other countries. Among other works of A. are *Tales from Jutland* (1859); *The Sandhills of Jutland* (1860); *Tales for Children* (1861); *The Wild Swans*, and *The Ice Maiden* (1863); *The Story of my Life*; *Ahasuerus*, a drama; and *New Tales and Adventures* (1872). His works have been translated into German, English, etc. His *Dying Child* has been translated into the language of Greenland; and on his 70th birthday he was presented with a book containing one of his tales in 15 languages. On the same occasion the king of Denmark gave him the grand cross of the Dannebrog Order. A. died in Aug., 1875. He is best known in America by his beautiful fairy tales. See Nisbet Bain's *Life and Letters of Andersen* (1895).

ANDERSON, a co. in s.e. Kansas; 576 sq.m.; pop. '90, 14,203. The productions are agricultural. Co. seat, Garnett.

ANDERSON, a co. in n. central Kentucky, on the Kentucky River, intersected by Salt River; 200 sq.m.; pop. '90, 10,610. Co. seat, Lawrenceburg.

ANDERSON, a co. in South Carolina, on Savannah river; 690 sq.m.; pop. '90, 43,696, inclu. colored. Two railroads pass through it. The surface is uneven; soil fertile and well cultivated to wheat, corn, cotton, etc. Co. seat, Anderson.

ANDERSON, a co. in n.e. Tennessee, on the Clinch and Powell rivers; 360 sq.m. pop. '90, 15,128, with colored. There are coal veins, and salt and sulphur springs; products, wheat, corn, and oats. Co. seat, Clinton.

ANDERSON, a co. in central Texas, on Trinity river; 1000 sq.m.; pop. '90, 20,923, inclu. colored. It is heavily timbered, and has a rolling surface and fertile soil, producing corn, cotton, and sweet potatoes. Co. seat, Palestine.

ANDERSON, city and co. seat of Madison co., Ind., on the west fork of the White river, and the Chicago and Southeastern of Indiana, the Cleveland, Cincinnati, Chicago and St. Louis, and the Pittsburg, Cincinnati, Chicago and St. Louis railroads. It is 35 m. n.e. of Indianapolis, has churches, banks, a normal college, manufactures iron, paper, glass, wire-nails, straw boards, tiles, etc., in the operation of which natural gas is used. A canal with a 44 foot fall supplies water power for milling. Pop. 1890, 10,741.

ANDERSON, ALEXANDER, 1775-1870; the first American wood engraver, son of a Scotch printer of a patriotic paper in New York, *The Constitutional Gazette*. At the age of 12, A. made attempts at engraving on type metal and copper plates. Then he studied medicine, and took the degree of M.D. in Columbia college in 1796; but he returned to art studies, his first regular employment being in illustrating a small book called the *Looking Glass for the Mind*. He invented his own tools, and followed Bewick of England in using wood blocks for engraving, in which he attained great perfection. He illustrated the first edition of Webster's *Spelling Book*, and for many years the American Tract Society's publications.

ANDERSON, Sir EDMUND, 1540-1605; an English judge, chief justice of common pleas in 1582, distinguished for zeal in the cause of the established church and for harshness toward dissenters. He was one of the commissioners in 1586 to try queen Mary of Scotland, and afterwards to try Sir Walter Raleigh. His reports of cases in his time in the common pleas and the courts of Westminster are very valuable.

ANDERSON, JAMES, 1662-1728; a Scotch lawyer and antiquary, of high reputation as a historian. He was employed by the Scotch parliament to prepare for publication what remained of the public records of the kingdom; on this work he labored many years, but he did not finish it, though it was published after his death. After the union he was appointed postmaster-general of Scotland, 1715, but lost the place two years later, and did not secure any adequate reward for his immense literary labor. His *Royal Genealogies from Adam to These Times* appeared after his death.

ANDERSON, JAMES, LL.D., a writer on political economy and agriculture, was b. in 1739 at the village of Hermiston, near Edinburgh. He lost both his parents when very young, so that the management of a large farm, which had been in the possession of the family for a long time, devolved upon himself. Recognizing the practical importance of a knowledge of chemistry to a farmer, he attended the chemistry class in the university of Edinburgh, and brought the results of his study to bear on his profession. He invented, at an early period of life, the small two-horse plough without wheels commonly called the Scotch plough, which is generally admitted to have been one of the most useful improvements of agricultural implements ever introduced. When only 24 years of age, he went to Aberdeenshire, where he rented a large moorland farm of 1300 acres. Here he remained for a considerable time, devoting his leisure hours to writing upon agriculture. His first attempt was a series of essays upon planting, which, under the signature of *Agricola*, he contributed to the *Edinburgh Weekly Magazine*. In 1780, the university of Aberdeen bestowed on him the degree of doctor of laws. In 1784, on account of his pamphlet, entitled *Encouragement of the National Fisheries*, he was engaged by government to make a survey of the western coast of Scotland, with special reference to that object. He next commenced in 1791 the publication of a periodical called *The Bee*, which was continued for three years; in 1797 he went to London, where he pursued his literary avocations with such intense assiduity, that his health gradually gave way. He died on the 15th of Oct., 1808.

A. will deserve a place in any record which details the remarkable advances made by Scotland in agriculture and other sources of wealth in the latter half of the 18th century. His *Bee* was the type of many periodical miscellanies of a cheap nature, mingling in structure with entertainment, which have since been published. It is also to be observed that, in his essay called *A Comparative View of the Effects of Rent and of Tithe in Influencing the Price of Corn* (contained in one of his latest publications, *The Recreations of Agriculture*), he anticipated some important principles subsequently advocated by Malthus, Ricardo, and West, particularly the famous theory of rent.

ANDERSON, JOHN, F.R.S., professor of natural philosophy in the university of Glasgow, and founder of the eminently useful institution bearing his name, was b. in the parish of Roseneath, Dumbartonshire, in 1726. He studied at the university of Glasgow, in which, in his 30th year, he was appointed professor of oriental languages. Four years later (1760) he was transferred to the chair of natural philosophy. He entered upon his new duties with extraordinary ardor. Besides the work of the class, he was indefatigable in studying the application of science to mechanical practice.

Inspired by a rational philanthropy, he instituted, in addition to his usual class, which was strictly mathematical, one for artisans. He continued to teach this *antitoga class*, as he called it, twice every week, during the session, to the end of his life. In 1786 appeared his valuable work, entitled *Institutes of Physics*, which went through five editions in ten years. Shortly before the French revolution, he invented a species of gun, the recoil of which was stopped by the condensation of common air within the body of the carriage; but having in vain endeavored to attract the attention of the British government to it, he proceeded to Paris in 1791, and, being himself a great friend of liberty, presented his model to the national convention. It was hung up in their hall, with the following inscription over it: "The gift of SCIENCE to LIBERTY." Afterwards, when the allied monarchical forces had drawn a military cordon around the frontiers of France, to prevent the introduction of French newspapers into Germany, A. ingeniously suggested the expedient, which was adopted and proved quite successful, of making small balloons of paper, to which newspapers and manifestoes might be tied, and letting them off, when the wind was favorable, for Germany. A. died 13th Jan., 1796. By his will, dated 7th May, 1795, he directed that the whole of his effects, of every kind, should be devoted to the establishment of an educational institution in Glasgow, to be denominated *Anderson's University*, for the use of the academical classes.

ANDERSON, LARZ, 1805-78; b. Ky.; a capitalist and philanthropist, prominently connected with many charities and public enterprises in Cincinnati.

ANDERSON, MARTIN BREWER, LL.D., b. Maine, 1815; a graduate of Waterville college: tutor of Latin, and in 1843 became professor of rhetoric in the same institution. He resigned in 1850 and became editor of the *New York Recorder*, a Baptist paper. In 1853 he was called to preside over the new Rochester university, and in 1868 was offered (but declined) the presidency of Brown university. He was a vigorous and popular preacher, though never ordained to the ministry. He d. 1890.

ANDERSON, MARY ANTOINETTE (MADAME NAVARRO), American actress, was born at Sacramento, Cal., in 1859. Her father, General Anderson, was killed in the civil war, and her mother married Dr. Hamilton Griffin and removed with him to Louisville, Ky. At the age of thirteen Miss Anderson began to study for the stage under Charlotte Cushman, and made her debut in the character of *Juliet* at Louisville, Nov. 27, 1875, with such success that she was engaged for other rôles. In 1876 she traveled through the west, and in the season of 1877-78 appeared in Philadelphia, New York, and Boston. In 1884-85 she played at the Lyceum Theatre, London, and in the character of *Rosalind* in "As You Like It," opened the Memorial Theatre at Stratford-on-Avon. From 1885 to 1889 she played both in Great Britain, her chief parts being *Juliet* (*Bianca* in "Fazio"), *Julia* (in "The Hunchback"), *Eadne*, *Meg Merrilies*, *Pauline*, *Galatea*, *Clarice* (in "Comedy and Tragedy"), *Parthenia* and *Rosalind*. Illness in 1889 compelled her to retire temporarily from the stage; in 1890 she married Antonio Navarro de Viana, of New York, and left the stage.

ANDERSON, RASMUS BJÖRN, b. Albion, Wis., 1846. From 1875 to 1884 he was professor of Scandinavian languages and literature in the university of Wisconsin, and was U. S. minister to Denmark, 1885-89. Besides contributions to periodicals and encyclopedias he has published *America Not Discovered by Columbus*, 1874; *Norse Mythology*, 1875; *Viking Tales of the North*, 1877, and numerous translations, including the works of Björnstjern Björnson (1881-82) and Brandes' *Eminent Authors in the Nineteenth Century* (1886).

ANDERSON, RICHARD H., 1821-79; b. S. C.; graduated at West Point in 1842; served in the Mexican war, and rose to captain of dragoons; resigned in 1861 and entered the confederate service as colonel of infantry. At the close of the war he had reached the grade of lieutenant-general.

ANDERSON, ROBERT, b. Ky., 1805; d. France, 1871; brigadier-general in the U. S. army. He graduated at West Point in 1825; served in the Black Hawk war of 1832, and in the Florida war, and, May, 1838, became assistant adjutant-general on gen. Scott's staff. He was in the Mexican war, and was wounded at Molino del Rey. In 1857 he was made major of the 1st artillery. In Nov., 1860, he took command in Charleston harbor, and was for fifteen weeks shut up in fort Sumter by the confederates. On April 14th, after a bombardment of 36 hours, being short of provisions, though the fort was still tenable, he marched out with the honors of war, losing none of his men, and went to New York. He was appointed brigadier-general in May, 1861, and sent to command the department of the Cumberland, but his health failed, and with brevet of major-general in the regular army he retired from the service. He translated and adapted several works on artillery practice.

ANDERSON, RUFUS, D.D.; LL.D. b. Maine, 1796-1880; graduate of Bowdoin, 1818; studied theology at Andover. He was secretary of the American board of foreign missions for 34 years. Resigning at the age of 70, he received a gift of \$20,000 from New York and Boston subscribers, all of which he gave to the American board. He was the author of various books concerning missions and the work of the American board.

ANDERSONVILLE, a village of Sumter co., Ga., on the Central Georgia railroad, 60 m. s. of Macon. Here was situated a military prison of the southern confederacy. The prison site was a pine and oak grove of 22 acres, on the side of a hill, of red clay, 1600 ft. e. of the railroad. The first prisoners arrived Feb. 15, 1864, and the last in April, 1865; total received, 49,485; died, 12,926; of which 3952 died from diarrhoea; 3574 from scurvy; 1648 from dysentery. The prison was notorious for unhealthfulness and its discipline for severity; and in 1865, after the close of the war, Henry Wirz, a Swiss, the chief instrument of ill treatment, was indicted for "injuring the health and destroying the lives of prisoners by subjecting them to torture and great suffering, by confinement in unhealthy and unwholesome quarters, by exposing them to the inclemency of the winter and the dews and burning sun of the summer, by compelling the use of impure water, and by furnishing insufficient and unwholesome food; for establishing the dead line and ordering the guards to shoot down any prisoner attempting to cross it; for keeping and using bloodhounds to hunt down prisoners attempting to escape; and for torturing prisoners and confining them in stocks." He was found guilty and hanged Nov. 10, 1865. The village has a large national cemetery, adorned with gravel walks and trees; 12,461 dead soldiers of the union army were identified, and their places of burial marked.

ANDERSSON, CARL JOHAN, 1827-67; natural son of an English sportsman residing in Sweden. In 1849, he joined Francis Galton in a journey in South-west Africa, continued alone through 1853-54, and on his return to England published *Lake N'gami, or Explorations and Discoveries during Four Years' Wanderings in the Wilds of South-western Africa*. He made a journey to lake N'gami in 1858 with Green, the elephant hunter, and found his way to the red tribes of Herrevo land. On his return he published a book on the Okovango river. In May, 1866, he went on an exploration to the Cunene for the purpose of establishing commercial intercourse with the Portuguese settlements n. of that river. He came in sight of the stream, but was too feeble to cross it, and died in trying to return to Cape Town.

ANDERTON, THOMAS, composer, born in Birmingham, England, April 15, 1836. Although an amateur, his works are frequently played at musical festivals and concerts. These include: a symphony and overtures for orchestra, string-quartets, pianoforte music, and cantatas on Cowper's *John Gilpin* and on Longfellow's *Wreck of the Hesperus*.

ANDES, the great mountain chain of South America, extending in a direction nearly parallel with the Pacific, along almost the whole length of the continent. The chain falls short of the isthmus of Darien, between which and the Atrato—a river falling into the Caribbean sea—it gradually subsides into a merely undulating country. It appears, also, to fall still further short of the strait of Magellan, so far as the mainland is concerned. But, on geological grounds, it has been traced, first along the islands that breast Patagonia to the w., and next along those that form the Fuegian archipelago. Thus may the chain be said to stretch from the neighborhood of the mouth of the Atrato, not merely to Cape Horn, but even to the rocks of Diego Ramirez, which lie about 60 m. to the s.w. of that promontory. The extreme length, therefore, is from lat. 8° 15' n. to lat. 56° 30' s.—comprising, of course, 64° 45', or, without any allowance for windings or deviations, about 4500 English miles. But to mark the scale on which nature has molded the new world, the A. may be regarded as merely a part of the sufficiently continuous chain of about 9000 m. which loses itself near the mouth of the Mackenzie, towards the shores of the Arctic ocean. In this respect, the old continent can bring nothing into comparison.

Position.—The A., besides being generally in a direction nearly parallel with the Pacific, verge closely on that ocean. From the rocks, indeed, of Diego Ramirez to about lat. 40° s., the mountains, whether they are found on islands or on the mainland, are almost literally washed by the surf; while northward from that parallel, there spreads out, between the chain itself and the sea, a belt of land not exceeding, in average breadth, 70 or 80 miles. Within the limits of Peru, the belt in question is narrowest, while above and below it is, in general, somewhat more extensive. The position of the A. with respect to the Atlantic ocean presents a striking contrast. To illustrate this, a passage is subjoined from Herndon, the explorer of the Amazon in behalf of the United States. Crossing from Lima to the head-waters of the Amazon, by the pass of Antaranra, he writes thus: "Yanacoto, on the western slope of the A., at the height of 2337 ft. above the sea-level, is only 28 m. from the ocean that washes the base of the slope on which it is situated; while Fort San Ramon, at nearly the same elevation on the opposite side, cannot be much less than 4000 m. from its ocean by the windings of the river, and in the river's direct course is at least 2500 miles." Further to compare the two areas respectively to the w. and e. of the dividing ridge, the former has been estimated at 180,000 sq. m., and the latter at twenty times as much.

Hydrography.—This interesting feature of the A. has been already anticipated to a considerable extent, under the heads of the AMAZON and AMERICA. It only remains to observe that from one end of the continent to the other, the true and only water-shed, wherever there are two ranges, is the range nearer to the Pacific. Not only is the watershed in question obviously far closer to the w. than to the e., but, beyond this, it is, apparently without a single exception, pushed as far to the westward as possible; it

thus affords the most conspicuous and most decisive example of an almost universal law in the hydrography of the earth. Throughout both continents, almost every leading water-shed presents a longer descent towards the e. than towards the w., or, in other words, sends off larger streams in the former direction than in the latter. To cite a few instances: compare, in North America, the Missouri with the Columbia; in Europe, the Volga with the Neva; in Asia, the Hoang-ho of China with the Oxus of the sea of Aral; and even in Africa, where, as also in Arabia, hydrographical traces have been largely overlaid by deserts of sand, the plateau of the Sahara and the chain of the Atlas gradually incline, both of them, towards the e. But, if the water-shed be invariably found as far as possible to the westward, it necessarily follows, that, wherever there are two ranges, the more easterly range cannot also be a continuous water-shed—unless, indeed, it may be regarded as such with respect to the landlocked basin of the connected lakes, Titicaca and Uroz, already mentioned under the head of AMERICA. With this exception, all the gatherings between the two ranges, whether the intermediate space be plateau or sierra, have found or formed channels of escape—narrow, deep, and dark as they often are—only to that sea which is 30 or 40 times more distant than the one at their back.

Breadth and Area.—The area, on an estimate, necessarily rough and vague, has been computed to be triple that of the belt of comparatively level land that borders on the Pacific. In other words, the average breadth of the chain is reckoned to be thrice that of the belt in question. In a rough way, the breadth may be estimated from the very shore of the Pacific, whence the w. slope commences, to the lowest *pongos*, or cataracts, on the eastward streams. But it is more correct to measure it from the foot of the mountains, properly so called, on the one side to that on the other. The phraseology of the country, which, on such a subject, ought to be conclusive, appears to support the latter mode of computation. In Lima and its neighborhood, where Herndon crossed the A., that officer speaks of “coast” and “sierra,” as distinguished from each other even to the westward of the dividing ridge. The entire distance of the pass of Antarangra, as measured on the actual road, was 87 m.—the first 50 being *coast* and the remaining 37 being *sierra*. Nor does the distinction seem to have been an arbitrary one. From Callao to Cúchaca—a line of 44 m.—the rise above the sea-level, tolerably uniform the whole way, amounted to 4452 ft., or rather more than 101 ft. to the mile; but the next 15 m., of which about a half still belonged to what was called *coast*, yielded an increase of 2850 ft., an average probably of 200 ft. for that part of the stage that fell under the definition of *sierra*. To give instances of extreme breadths of the A.—an average breadth being unattainable—the least breadth, and that in Patagonia, is believed to be 60 or 70 m.; the greatest breadth, again, pretty nearly on the parallel of lake Titicaca, and right through the grand plateau of Bolivia, is said to be 400 m.; and to give an intermediate case, the breadth from Mendoza, in the basin of La Plata, to Santiago, in Chili, is given at 140 m.—the former city being 4486 ft. above the Atlantic, and the latter 2614 above the Pacific.

In order, then, to have a definite idea of the breadth of the A., the chain must be viewed from one end to the other. In doing this there will be adopted the ordinary nomenclature, referring each division of the A. to the particular country through which it may pass.

Patagonian Andes.—Including the A. of the Fuegian archipelago, this part of the chain, extending from lat. 56° s. to lat. 42° s., a distance of more than 960 m., is the narrowest of all, or is, at all events, too irregular to have its breadth accurately estimated. The Patagonian shore, strictly so called, is breasted, very much like the n.w. coast between Fuca's strait and Mt. St. Elias, by a number of islands. On these, as already mentioned, the true A. are to be found, or rather, of these the true A. consist—the continent itself affording no footing to the chain till fully 300 m. to the northward of Cape Horn. Even after the chain has laid hold of the mainland, it by no means can be said to abandon the islands; so that here, as farther to the n., the chain may be regarded as made up of parallel ranges—the main difference being that the intervening valleys, which, to the n., are basins of fresh-water rivers, here present salt-water channels.

Chilian Andes, stretching from lat. 42° s. to lat. 24° s., a distance of nearly 1250 miles. Throughout nearly the whole of this line, the A. consist of only one range, for the parallel ridges, which run along between the great water-shed and the Pacific, cannot claim to be any exception to this remark, inasmuch as their highest points do not exceed an elevation of 2500 ft. above the level of the sea. This part of the chain, however, presents several lateral ranges, if it does not present any parallel ones of importance. These spurs are to be seen on both sides, though of very different magnitudes. To the w. they are akin to the comparatively insignificant parallel ranges just noticed, being, if A. at all, merely A. in miniature. But to the e. the spurs deserve more consideration. They are two in number, the one branching off between the 33d and 31st parallels, and the other between the 28th and 24th. The former, called the Sierra de Cordova, advances like a promontory into the plains of Rio de la Plata, or Pampas, as they are more generally denominated, as far as the 65th meridian; and the latter, called the Sierra de Salta, runs nearly as far to the e., and in a direction nearly parallel.

Peruvian Andes.—This part of the chain, stretching from lat. 24° s. to lat. 6° s.—a distance about the same as in the last paragraph—is perhaps the broadest of all the divisions of the A. It certainly contains the largest of the plateaus, the plateau of Bolivia. Between the 20th and 19th parallels, not far from the city of Potosi, the chain separates into two ranges, known as the East and West Cordilleras of Bolivia; and it is the reunion of these ranges, between the 15th and 14th parallels, that incloses the landlocked plateau of Titicaca, containing, as is said, 30,000 sq.m., or an area equal to that of Ireland. Immediately above this table-land, the united ranges in question constitute the mountain-group of Cuzco, which, in point of superficial extent, is stated to be thrice as large as all Switzerland. About a degree further north, the chain again separates as before, reuniting also, as before, between the 11th and 10th parallels, so as to embrace the cities of Guanta and Guancavelica. Hardly have the two ranges reunited, when they mass themselves into the table-land of Pasco, not quite half the size of that of Titicaca. Further to the n., the chain divides, not into two, but into three ranges, which unite again, on the frontiers of Ecuador, in the group of Loxa, about lat. 5° s.

Andes of Ecuador.—Immediately beyond the group of Loxa, between 4° and 3° of s. lat., the chain divides into two ranges, which, by again uniting in 2° 27', form the valley of Cuença; and immediately beyond this is the group of Assuay, with its table-land. Then another plateau of no great extent, and a short stretch of the undivided chain, lead to the vast table-land of Quito, which is said to be subdivided by low hills into five smaller plateaus, two to the east and three to the west. Towards the n. the table-land of Quito is succeeded by the group of Los Pastos, forming the extreme portion of the A. of Ecuador.

Andes of Colombia.—Beyond the city of Almaguer the chain breaks off into two ranges, which never again join each other. The range on the w. side remains undivided, till it disappears near the mouth of the Atrato, a little to the e. of the isthmus of Darien. But the range on the e., after massing itself into the group of Paramo de los Papas, breaks into two branches, which, as distinguished from the range aforesaid on the west are styled the Central and Eastern Cordilleras of Colombia. These two contain between them the upper waters of the Magdalena, the eastern separating them from the basin of the Orinoco, and the central dividing them from that of the Cauca. Between them also they contain several considerable table-lands, the principal one being that of Santa Fé de Bogota.

Height.—Under this head must be treated separately the *plateaus*, the most prominent *mountains*, and the *passes*—the altitudes of the lines of perpetual snow falling more naturally under the head of climate. Here, as in the case of *breadth*, the chain will be followed from south to north.

HEIGHT OF PLATEAUS.

	Feet.
Table-land of Titicaca.....	12,700
Group of Cuzco.....	8,300
Table-land of Pasco.....	11,000
“ “ Assuay.....	15,520
“ “ Quito.....	9,543
“ “ Bogota.....	8,958

The average height of these six colossal masses above the sea-level is thus 11,000 ft., or considerably more than two English miles.

HEIGHT OF MOUNTAINS.

<i>Frægian Andes</i> —	Feet.	<i>Bolivian Andes</i> —	Feet.
Cape Horn.....	3,000	Cerro de Potosi.....	16,040
Sarmiento.....	6,800	Gualtieri.....	22,000
<i>Patagonian Andes</i> —		Nevado de Chuquibamba.....	21,000
Yanteles.....	8,030	“ Illimani.....	21,150
Corcobado.....	7,510	“ Sorata.....	21,290
Minchinadom.....	8,000	Analache.....	18,500
<i>Chilian Andes</i> —		<i>Andes of Ecuador</i> —	
Antuco.....	13,000	Chimborazo.....	20,511
Aconeagua.....	22,296	Cotopaxi.....	19,550
Descabezado.....	12,102	Antisana.....	19,092
Nevado de Chorolque.....	16,546	Pichincha.....	15,920
<i>Peruvian Andes</i> —		Cayambe.....	19,250
Arequipa.....	20,320	<i>Andes of Colombia</i> —	
		Pic de Tolima.....	18,314

This last-named mountain is said to be the only one in Colombia that rises above the limit of perpetual snow. All the others appear to fall short of that line.

HEIGHT OF PASSES.			
	Feet.		Feet.
<i>Chilian Andes—</i>		<i>Bolivian Andes—</i>	
La Cumbre.....	12,454	Potosi.....	14,320
Portillo.....	14,365	Las Gualillas.....	14,830
<i>Peruvian Andes—</i>		<i>Andes of Ecuador—</i>	
Alto de Jacaibamba.....	15,135	Assuay.....	12,385
Lachagual.....	15,480	<i>Andes of Colombia—</i>	
Antarangra.....	16,199	Quindiu.....	11,500

These passes will bear a comparison with the loftiest pinnacles in Europe. The last and lowest overtops the highest summit of the Pyrenees by 332 feet; while the last but two, that of Antarangra, which Herndon traversed, soars 389 ft. above Mont Blanc, the culminating peak of the Alps.

The passes across the A. present a vast variety of surfaces and levels. They appear to skirt, as often as practicable, the mountain-torrents; and, when that is impracticable, sometimes surmount them by bridges, and sometimes avoid them by means of a path cut along the shoulder of the overhanging height. A railway is (1897) in process of construction across the Andes s. of Aconcagua.

With respect to the mountain-torrents, Herndon, after leaving Antarangra behind him, was enabled to avail himself chiefly of this resource. "As far as the traveler," says he, "is concerned, there are not, on the route we have traveled, two ranges of the A.—that is, he is not to ascend and descend one range, and then ascend and descend another. From the time that he crosses at Antarangra, his progress is downward, till he reaches the plain. Really, however, there are two ranges. The streams from the first or western range have broken their way through the second, making deep gorges, at the bottom of which the road generally runs, and leaves the peaks of the second range thousands of ft. above the traveler's head."

In addition to the essential perils of such a course, Herndon encountered, on one occasion, an incidental danger, which he thus describes—the scene being a narrow path on the shoulder of an almost precipitous hill: "Mr. Gibbon was riding ahead. Just as he was about to turn a sharp bend, the head of a bull peered round it on the descent. When the bull came in full view, he stopped; and we could see the heads of other cattle clustering over his quarters, and hear the shouts of the cattle-drivers, far behind, urging on their herd. I happened to be abreast of a slight natural excavation; and, dismounting, I put my shoulder against my mule's flank, and pressed her into this friendly retreat; but I saw no escape for Gibbon. The bull, with lowered crest and savage look, came slowly on, and actually got his head between the perpendicular wall and the neck of Gibbon's mule. But his sagacious beast, pressing her haunches hard against the rock, gathered her feet close under her, and turned as on a pivot. This placed the bull on the outside; and he rushed by at the gallop, followed in single file by the rest of the herd."

In the bridging of the mountain-torrents, a good deal of rude ingenuity is displayed. Sometimes chains are suspended from side to side, and sometimes a rough flooring is laid between projecting beams from either bank, which have previously been fixed as solidly as possible. Nature also has done something in this respect to help man, having thrown two bridges of her own over a fearful chasm at Icononzo. The torrent which they span, falls down a beautiful cataract into a murky crevice—the noisy haunt of nocturnal birds. At a height of 400 ft. above the foaming waters, the two bridges hang in mid-air, both of them, apparently, though in different ways, the work of an earthquake. The upper one is merely a fragment of the original sandstone, which must have resisted the shock that formed the rent; while the lower, probably the most singular arch in the world, consists of three detached rocks, so adjusted as to support each other.

The loftiest pinnacles of the A., when viewed from the table-lands, and, still more, when seen from the crests of the passes, lose, to the eye of the beholder, much of their real altitude. Under such circumstances, not a single mountain presents the actual dimensions of Mont Blanc, as overhanging the vale of Chamouni. It is only from a distance—best of all, perhaps, from a good offing in the Pacific—that the A. appear in all their gigantic proportions. Standing thus on their pedestal, the most rugged and colossal in nature, they almost realize to the spectator the highest Pyrenees piled on the highest Alps; while, to enhance the grandeur of the scene, the igneous action, which has heaved the chain into existence, is here and there adding to its stature a pillar of smoke and flame.

The geology of the A. is as yet very little known. It is more than half a century since Humboldt traveled through these mountains, and to him we are even now chiefly indebted for our knowledge regarding them. At that time, geology was in its infancy—its language had not been formed; its classification, at least as it now exists, was unknown, and its facts were mixed with absurd and now long-exploded theories; it could, in fact, scarcely be called a science. It is fortunate that as regards the materials constituting the great mass of the A. range—the igneous rocks which form its backbone, and the metamorphic rocks which form its great bulk—our knowledge was almost as extensive and explicit 50 years ago as it is now, and therefore, in respect to them, Humboldt's observations are as good as if made but yesterday. Not so as regards the more recent sedimentary formations. The value of fossils was not then known, and the vaguest ideas prevailed as to the chronological order of the stratified rocks. Hence

descriptions written at that time are almost valueless to modern science. A few scattered notes may be gleaned from the small number of intelligent travelers who have recently visited these mountains; and to them we are obliged for any of the facts we are able to give regarding the deposits referred to.

The elevation of the A. took place at an epoch anterior to the formation of the Rocky mountains of North America, which are geographically a continuation of them. They are composed, to a very large extent, of stratified metamorphic rocks. It is remarkable that granite occurs in them not as an unstratified plutonic rock, but only intercalated with the other members of the stratified azoic series. The true igneous rock belong either to the trappean or volcanic divisions. The grand ridge is everywhere covered with one or other of the varieties of trap (greenstone, clinkstone, basalt, or porphyry). These are often broken into columns, and appear at a distance like ruined castles, producing a very striking effect.

Bursting through the trap-rocks, there are a number of *volcanoes* covering their summits with more recent igneous rocks. Among the mountains specified above as to altitude, Yanteles, Corcobado, Minchinadom, Antuco, Gualteri, Arequipa, Cotopaxi, Antisana, and Pichincha belong to this class. Fifty-one volcanoes have been described as existing throughout the whole range. The mountains of Ecuador are so extensively and continuously of volcanic origin, that they have been regarded as different safety-valves of one and the same burning vault. It is generally maintained that there is a relation between the height of a volcano and its activity and the frequency of its eruptions. Thus, Stromboli (2957 ft.) has continued in a state of activity since the earliest ages, serving the purpose of a light-house to the navigators of the Tyrrhenian sea; while Cotopaxi (18,887 ft.) and Tunguragua (16,579 ft.) have been active only once in a hundred years. Many of these 51 volcanoes have consequently not yet been observed by Europeans in an active state. In the Quito district there are 10 active and 7 of doubtful activity; in Peru and Bolivia, the numbers are 9 and 3; in Chili, 17 and 5; making in all 36 active and 15 about which there is some uncertainty as to their activity. Another characteristic of these volcanoes, resulting from their gigantic altitude, is that few of them emit streams of lava. Thus Antisana is probably the only one in the Quito range that has ejected lava. The force, however, which is repressed apparently by the immense superincumbent mass which fills the crater, is exhibited in a terrific manner when an eruption does take place. Cotopaxi, for instance, the most regular and beautiful outlet of this the grandest of nature's laboratories, has been known to shoot its fiery torrents 3000 ft. above its snow-bound crater, while its voice is said to have been heard at a distance of 550 miles. On one occasion, a piece of rock, measuring 300 cubic ft., was thrown from its crater to a distance of more than 8 miles.

Earthquakes are intimately connected with these volcanic phenomena. No portion of the globe is subject to such frequent and destructive earthquakes as the countries embosomed within the range of the A., and those lying between them and the Pacific. The cities and towns of Bogota, Quito, Riobamba, Callao, Copiapo, Valparaiso, and Concepcion have all at different times been more or less devastated by their agency. During the year 1859, an earthquake buried many of the inhabitants of Quito under the ruins of its churches and public edifices; scarcely a single building of any size having escaped uninjured.

It is to the same subterranean agency that upheaved and still convulses the A. that we are to ascribe those fearful ravines which are almost peculiar to the chain. An apt instance has already been cited in the case of the deep and dismal crevice which has been spanned by the natural bridges of Icononzo. A still better specimen is the valley or den of Chota, which, with a width at top of only 2600 feet, is 4875 feet in perpendicular height. This den might overlap the loftiest hill in Scotland, with St. Peter's at Rome on its summit.

The flanks of the mountains are clothed with crystalline stratified rocks, consisting of innumerable varieties of granites, gneiss, schists, hornblende, chloritic slates, porphyries, etc. These have been greatly disrupted by the underlying igneous rocks, and now occupy a vertical or nearly vertical position. They often run up into bold and rugged peaks on the summits. They alternate with each other in great meridional bands, but without any apparent order in the succession, except that the varieties of schist depend on the crystalline parent rock below; otherwise, no regular sequence can be observed; for miles, only granite and gneiss are found, then schist, quartz, gneiss, etc., interchanging. The variety and quantity of the mineral wealth of these rocks is remarkable; with the exception of lead, most of the metals are obtained in large quantities—see below. The topaz, amethyst, and other gems are abundant.

Lying uncomfortable with these almost vertical metamorphic rocks, there occur in the valleys and table-lands, and creeping up the base of the mountains, a variety of fossiliferous beds, which require further examination before they can be clearly understood. A better estimate of the nature of these deposits will be arrived at by describing one of the localities where they occur. Take the large plateau on which Bogota is built, which is 8958 ft. above the sea. The deposits filling up this plain have been formed subsequent to the present conformation of the district, though not necessarily at the present altitude: the whole range may have been since elevated. The almost horizontal rocks, from their organic contents, consisting of ammonites, hamites, etc., have been re-

ferred by Edward Forbes to the cretaceous era. The basin consists of many beds of sandstones, limestones, shale, coal, gypsum, and salt. The salt occurs in large quantities, one bed being no less than 100 ft. in thickness, and the coal in sufficient abundance to be wrought. All these rocks have been more or less affected by their proximity to the underlying metamorphic rocks. The molecular action going on below has in many places been continued in them, and has induced a cleavage at right angles to their planes of stratification. The other patches—some of great extent, as the plateau of the Titicaca—cannot yet be referred to any particular geologic epoch. Coal has been found near Huanco, in Peru, at the height of 17,000 ft.; fossiliferous limestones and sandstones have been noticed in Peru at Micupampa and Huancavelica.

Metals.—The aboriginal term A. is said to have been derived from the Peruvian *anta*, which signifies metal in general, or rather, perhaps, copper in particular. Within the limits of the empire of the incas, mining-tools, evidently not European, have been dug up in various places; and in one district the ancient Peruvians have left behind them traces of their mining operations at a height of 17,000 ft. Moreover, the term, whatever may have been its meaning, appears to have been, at all events, of Peruvian origin, for it does not seem to have been applied to the great chain of mountains by the aborigines of New Granada, now called the United States of Colombia.

The A. are understood to yield every metal used in the arts.

Gold is found in Chili, Peru, and Colombia. In Chili, however, it is so little productive that proverbially a gold-mine is inferior to a silver one, and that, again, to a copper one. In Peru, gold is most abundant between the 9th and 7th parallels; though further s., to the e. of Lima, the mines of Carabayo have been recently wrought to great advantage; and further s. still, to the e. of Titicaca, very rich washings are situated on the river Tipuani. In the Colombian states, gold-mines are generally so inaccessible as not to bear the expense of working them. The washings, again, though perhaps remotely the product of the A., are confined chiefly to the alluvial soils that lie between the chain and either sea.

Silver also is found in Chili, Peru, and Colombia. In Chili, the most valuable, almost the only very valuable, mines are wrought on the e. face of the A., not far from the city of Mendoza, already mentioned in connection with the breadth of the chain. In Peru, the most productive mines are those of Pasco and Potosi. In those of Pasco, which have now been open for more than two and a quarter centuries without even approaching to exhaustion, the ore is a mixture of silver and oxide of iron. In the mines, again, of Potosi, whose very name has become a proverb, there are said to be no fewer than 5000 excavations, while, to all appearance, only the upper crust of the inexhaustible deposits has been penetrated. In Colombia, it is with silver as it has been shown to be with gold, the mines of the former metal, as well as of the latter, being so inaccessible as not to bear the expense of working them.

Mercury or *quicksilver* is found in Quito, near the village of Azogué, which lies to the n.w. of Cuenca—taking its name, as is said, from this metal; and it is found likewise in Peru, not far from Guancavelica, a t. situated, as already stated, to the n. of the group of Cuzco. The mercury exists chiefly in combination with sulphur, forming what is called cinnabar.

Platinum appears to exist only in Colombia; but like the gold-washings of that country, it is found rather in the alluvial soils, that have been flooded down from the chain, than in the chain itself.

Copper is found chiefly in Chili, but also in Peru. In the latter country, it is of little account in comparison with silver; but, in the former, it may be styled the staple metal, or even the staple production. The most valuable mines are in the northern and southern provinces; in Coquimbo and Copiapo above, and in the neighborhood of Araucania below.

Climate.—The climate of the A. is, at every point, affected by three different considerations—position with respect to the length of the chain, position with respect to its breadth, position with respect to its height.

In connection with the *length* of the chain, the variations of climate, though less peculiar than its variations under either of the other aspects, are not merely a counterpart of similar changes in other parts of the globe. In the new world generally, temperature rises and falls more rapidly in proportion to latitude than in the old; and, again, as within the new world itself, more rapidly in the s. than in the n. In connection, therefore, with the length of the A., the variations of climate may be regarded as the greatest possible—the tropical heat of the equatorial regions passing gradually into something like polar cold, even within a latitude not greater than that of Edinburgh. This may be best illustrated with reference to the limits of perpetual snow. Within the strait of Magellan, in about the latitude of Wales, the limit in question is only about 3500 ft., nearly the precise height of the summit of Snowdon. In lat. 33° s., about the center of Chili, the snow-line, according to Humboldt, is estimated at 12,780 ft.; while, on the nearly corresponding parallel, the Himalayas present on their northern slope a snow-line of 16,620 ft. In the tropical regions of the A., the snow-line seems to range from 16,000 ft. to 18,000. This result, excepting that it does not greatly surpass the height of the snow-line as above on the Himalayas, can scarcely be compared with anything in the old world, whose tropical regions do not present any chain of the requisite altitude for the purpose. The

explorations of Whymper (q.v.) have proved the incorrectness of the old assumption that there were no glaciers in the central and northern divisions of the A., as in Patagonia and Terra del Fuego. It was formerly believed that the alternations of heat and cold, or rather of thaw and frost, necessary to the production of glaciers did not exist in the lower latitudes of the A., where, generally speaking, every stage or terrace, as already noticed under the head of AMERICA, possesses an almost monotonous temperature. Whymper, who examined carefully many of the chief peaks, in 1880 announced with confidence that there are several glaciers, some of them of enormous extent, on Chimborazo, Cotopaxi, Antisana, Sincholagua, and at least six other great peaks.

In connection, next, with the *breadth* of the chain, the variations of climate, if not peculiar to the A., have no perfect parallel elsewhere. At every point, excepting, perhaps, towards the extreme s., the chain is almost as much of a water-shed to the clouds as it is to the rivers. Rarefied as the air is at the elevation of the A., no vapor, generally speaking, can cross them—even the existence of snow at the height of several miles being a phenomenon which, *a priori*, was hardly to be expected. This fact is rendered more important by the ordinary directions of the currents of air. The prevailing winds blow against the A., not alongside of them, being generally from the e. between the equator and 30°, and from the w. in latitudes towards the s. Thus, generally speaking, every section of the chain has permanently a windward and a leeward side—the former intercepting nearly all the moisture, and the latter being condemned to comparative drought. Peru, Chili, and Patagonia, one and all, confirm these observations in detail. On the w., Peru, unless in the immediate vicinity of the mountain-streams, is little better than a desert; while, on the e., the Montana, as it is called, is remarkable for its fertility. To the w., on the contrary, Patagonia has its glaciers to show as the result of its rains from that quarter; while, to the e., its five terraces, extending 700 m. to the Atlantic, are almost uniformly arid and sterile. Between Patagonia and Peru, Chili has something in common with both, resembling the former in its southern half, and the latter in its northern. To take the Pacific side alone: in the northern parts, showers are only occasional, sometimes at an interval of three years—the deficiency being partly supplied by frequent dews; while, to the s. of lat. 34°, the rains are sufficiently copious to form considerable rivers.

In connection, lastly, with the *height* of the chain, the variations of climate stand alone in the world, being approached, though at a great interval, only by the corresponding changes in Central America. The Alps, to take a familiar analogy, have, it is true, their gradations of climate. But, situated, in round numbers, on about the 45th parallel, they represent only half of the latitudes between the equator and the pole; while the A. of Quito, before reaching this level, must have seen melting into each other the temperatures of Borneo, India, Persia, Asia Minor, and Italy. Taking the snow-line of the A. of Quito at 18,000 ft., and that of the Alps at 8000, the lower and hotter 10,000 ft. of the former have no counterpart at all on the latter. Now, Herndon found Tarma to lie within this height, precisely at an elevation of 9738 ft.; and he there saw apples, strawberries, almonds, grapes, and maize—a state of things not far behind that at the foot of the Alps. No space remaining for details, one general observation must close this article. In an open locality, the naked eye may embrace half a zone, for, to quote a traveler's words, it may look upwards to the barley-field and the potato-patch, and downwards to the sugar-cane and the pine-apple. Perhaps the most striking instance of this more than telescopic vision is connected with the magnificent fall of Tequendama, the single outlet of the waters of the table-land of Bogota. This fall, 600 ft. high, leaps down from the temperate zone to the torrid, from rich crops of wheat to a few scattered palms.

ANDIRA, a genus of plants of the natural order *leguminosæ*, sub-order *papilionaceæ*, having an almost orbicular, one-celled, one-seeded pod.—*A. inermis* (formerly known as *geoffroya inermis*) grows in low savannahs in the West Indies, and is there called *cabbage tree* or *cabbage-bark tree*. It is a tree of considerable height, having pinnate leaves, with 13 to 15 ovato-lanceolate leaflets, and panicles of reddish lilac flowers. Its bark, called *cabbage bark* or *worm bark*, is a powerful anthelmintic; and although it has recently been discarded from the pharmacopœias of Britain, still finds a place in those of other countries, along with *Surinam bark*, the bark of *A. retusa* (formerly *geoffroya surinamensis*), a native of Surinam. Similar properties reside in the bark of several species of the allied genus *geoffroya*. Cabbage bark contains an alkaloid called *jamaïcina*.

AND IRON, or **HANDIRON**, is a term frequently to be met with in inventories of the furniture of old houses; and in most parts of the country is still used for what is less generally known as a fire-dog. Andirons are used for burning wood on an open hearth, and consist of a horizontal bar raised on short supports, with an upright standard at one end. A pair are used, one standing at each side of the hearth, and the logs of wood rest across the horizontal bars. The upright portions of the A. are of various forms, some of them, in later times, representing a human figure. More generally, the design is architectural, much ornamented with arabesques, and sometimes with the monograms of their possessors. The ornamental parts of the A. are sometimes silver, but more often copper.

ANDKHUY, a town formerly of Bokhara, but now of Afghanistan, central Asia, about 200 m. s. of Bokhara, in an oasis on a river of the same name flowing north-north-east from the Tirband-i-Turkistan mountains. It is west of Balkh and between the northern hills of the Paroparnisus and Oxus. It lies on the high-road to Herat, and is much exposed to the attacks of the emirs of Bokhara and Afghanistan. Down to the year 1840, it is said to have been tolerably flourishing. It was then subject to Bokhara, and was compelled to oppose the victorious march of Mohammed Khan, who besieged it during four months, and at last only took it by storm. The city was plundered, and left a heap of ruins. The sovereign, Gazanfer Khan, to preserve himself from utter destruction, threw himself into the arms of the Afghans. The land is fertile, but the climate is very unhealthful. The population consists principally of Turkomans, with a mixture of Uzbeks and a few Tadjiks.

ANDOCIDES, 467-391 B.C.; a Greek orator and diplomatist. He held for a time a command in the Athenian fleet, and was employed in various embassies to foreign states. He was implicated with Alcibiades in the charge of mutilating the busts of Hermes; he accused others, who were put to death, but he was deprived of the rights of citizenship and went into exile. Thrice he returned to Athens, and was as often sent out; but from 403 to 393 he held honorable positions there. Three orations by him of great historical value are extant.

ANDORRA, a valley in the eastern Pyrenees between the French department of Ariège and Catalonia, in Spain. It is inclosed by mountains, through which its river, the Balira, breaks to join the Segre at Urgel; and its inaccessibility naturally fits it for being the seat of the interesting little republic which here holds a kind of semi-independent position between France and Spain. Area (divided into six parishes) about 300 sq.m.; population stated by Deverell in 1890 as 5231. The capital is Andorra, on the Balira, with a pop. of 2000. The former abundant forests are becoming thin from use as fuel; there is much excellent pasture; vines and fruit-trees flourish on the lower grounds, and the mountains contain rich iron mines; but agriculture is so neglected, and the quantity of arable land so small, that the inhabitants partly depend for corn upon France. A was declared a free state by Charlemagne, in reward for services rendered to him by its inhabitants, when he was marching against the Moors. He retained certain rights which Louis le Débonnaire afterwards transferred to the bishop of Urgel, in 819 A.D., and which the bishop of Urgel still exercises. The republic is governed by a sovereign council of twenty-four members, chosen by the people, and the council elects two of its members to be syndics for life, who exercise the chief executive power. There are two judges called *viguier*s, of whom the first is appointed by France, which exercises a kind of protectorate, and the second by the bishop of Urgel. There is also a civil judge appointed by France and the bishop of Urgel alternately. The first *viguier* is a Frenchman, and the second a native of A. Under each *viguier* is an inferior judge called a *baillie*; but there is an appeal from his judgment to the civil judge, and finally to the court of cassation at Paris, or to the Episcopal college at Urgel. In criminal cases, there is no appeal from the court of the republic itself, in which the first *viguier* presides. The revenue of the state is derived from lands, and from some inconsiderable taxes. A sum of 960 francs is paid biennially to France, in return for which is granted the privilege of free importation of corn. A payment of 891 francs is made in the intervening years to the bishop of Urgel. The manner of life of the Andorrans is very simple. There are schools, but education is in a low state. There is a militia force of 600 men. In the Carlist wars the neutrality of A. was strictly respected, though various complications resulted from its connection with the bishop of Urgel, etc. French speculators have endeavored to introduce gambling at the springs of Escaldas. See Deverell, *Andorra* (1890).

ANDOVER, a market-t. of Hampshire, lies in the n.w. part of the co., lat. 51° 12' n., long. 1° 28' w. The origin of the t. dates from a remote antiquity, as might indeed be suspected from its name, which is a modification of the Saxon *Andeafaran*, i.e., ferry over the river Ande. It is said that the corporation of A. is as old as the time of king John. The inhabitants, 5852 in 1891, are chiefly supported by their malt-trade, their agriculture, and their traffic in timber with Portsmouth. At Weyhill, a few miles to the w. of the t., a fair is held, formerly one of the most celebrated and important in England. It lasts for six days. The church of A. is a new erection, in the early English style of architecture, and cost £30,000, was defrayed by the late rector, the Rev. W. S. Goddard. Various relics of antiquity have been discovered near Andover.

ANDOVER, a town of Essex co., Mass., bounded on the n. w. by the Merrimac river, drained by the Shawshen, a tributary stream, and traversed by the Boston and Maine railroad. The town proper, settled in 1643, lies on the e. bank of the Shawshen, 23 m. n. of Boston and 10 m. e. of Lowell, and includes several manufacturing villages. It produces flax, woolen goods, shoes, rubber goods, flannel, printer's ink and other manufactures. A. is noted, even in Massachusetts, for its educational institutions, namely, the Phillips Academy for boys, founded in 1778; Andover Theological Seminary (q. v.), founded in 1807; and Abbot Academy for young ladies, founded in 1829.

The town has banks, a public library, periodicals, an electric railway connecting with Lawrence, waterworks, and several public schools. There are several other places of the same name in the United States. Pop. '90, 6142.

ANDOVER THEOLOGICAL SEMINARY. at Andover, Mass., founded in 1807, and endowed by Samuel Abbot, John Phillips, jr., and Phoebe Phillips of Andover, Moses Brown and William Bartlet of Newburyport, and John Norris of Salem. Since the founding, the funds have been increased by large donations, and now amount to \$850,000. The value of the property is \$250,000. The theological seminary was placed under the same management as Phillips Academy, which had been in operation more than a quarter of a century; and its purpose was declared to be "to provide for the church a learned, orthodox, and pious ministry." It is one of the oldest distinctly theological schools in this country. The colleges had previously supplied the public training of candidates for the ministry. Its general plan has been taken as the model for many institutions of like purpose. The government is by a board of 13 trustees, 3 visitors, 9 professors, and a librarian. Since the foundation of the seminary, there have been 11 professors of sacred literature, 3 of Christian theology, 8 of sacred rhetoric, 4 of ecclesiastical history, 1 of Christianity and science, 1 of biblical history and oriental archæology, 1 of biblical theology, 1 in the special course, and 1 of elocution. In 1896 it had 9 professors and 4 lecturers. Special lecturers address the students every year in various departments of theological and practical instruction. Its situation is quiet and beautiful, about 23 m. n. of Boston. The seminary is under the control of Congregationalists, but is administered in a spirit of such evangelical liberality that many who are now eminent ministers in other denominations have availed themselves of its privileges. Room-rent and tuition are free, and indigent students are assisted. The course of study occupies three years, and the aim is for a solid and thorough training. An advanced or fourth year class has been established. It has a library of 50,000 volumes. On the roll of its professors, past and present, are names distinguished in all departments of theological learning. Its graduates are scattered through all portions of the United States, and as missionaries in many heathen lands.

ANDOVER THEOLOGY. See **NEW THEOLOGY**.

ANDRA'DA, DIEGO PAYVA D', 1528-75; a Portuguese theologian, who distinguished himself in the council of Trent, to which he was sent by king Sebastian. He wrote several volumes of sermons, and other works. His *De Conciliorum Auctoritate* was much esteemed at Rome for the great extension of authority it accorded to the pope. His *Defensio Tridentinæ Fidei* is a rare and curious work.

ANDRA'DA E SYL'VA, JOSÉ BONIFACIO D', 1765-1838; a Brazilian statesman and mineralogist. He studied in Paris under Lavoisier, and in 1800 was appointed professor of geology at Coimbra, and, soon after, inspector-general of the Portuguese mines. In 1812, he was made perpetual secretary of the Lisbon academy; in 1819, became one of Dom Pedro's ministers. When the independence of Brazil was declared, A. was made minister of the interior and of foreign affairs, but his democratic principles induced his dismissal from office, in July, 1823; and on the dissolution of the assembly in Nov. he was banished, living in exile in France until permitted to return, in 1829. When Dom Pedro I. abdicated, April 7, 1831, he selected A. for the guardian and tutor of Dom Pedro II. In 1833, A. was again arrested, this time for intriguing in behalf of Dom Pedro I., and was deprived of position, passing his remaining years in retirement. He wrote no large work, but many papers on mines and mining.

ANDRAL, GABRIEL, a celebrated French physician, member of the institute and of the academy of medicine, was b. in Paris on the 6th of Nov., 1797. In 1823, he established his reputation by the publication of the first part of his *Clinique Médicale*; in 1828, partly through the influence of M. Royer-Collard, whose daughter he had married, he was appointed professor of hygiene; and in 1830, was advanced to the chair of internal pathology, a branch of medical science which had always possessed great attractions for him. A., in fact, commenced his investigations with pathological anatomy. He presented to the academy, at a comparatively early period of his career, a paper, *Sur l'Anatomie Pathologique du Tube Digestif* (on the pathological anatomy of the alimentary canal), which was greatly admired. Besides, he published, in 1829, a *Précis Élémentaire* of the same science, which met with striking success; and his *Clinique Médicale* treats principally of diseases of the chest, of the abdomen, and of the brain. In 1839, A. was almost unanimously elected by his colleagues to succeed Broussais in the chair of pathology and general therapeutics, the highest in the school. Here he showed the vast range of his medical knowledge; but in occupying himself so much with the pathological anatomy of the dead body, it is alleged that he did not pay sufficient attention to the phenomena of disease before the organs begin to exhibit traces of alteration. Though actively engaged in his general practice, he found time to write several other works besides those already mentioned. In 1835, appeared his *Projet d'un Essai sur la Vitalité*; in 1836, he edited and considerably enlarged Laennec's *Traité de l'auscultation Médiate et du Cœur*; in 1836-37, a *Cours de Pathologie Interne*; in 1837, his report to the academy, *Sur le Traitement de la Fièvre Typhoïde par les Purgatifs*.

in 1843, he presented to the institute his *Traité Élémentaire de Pathologie et de Thérapeutique Générale* (published in 1840), etc. He died in 1876.

ANDRASSY, GYULA, Count, b. 1823; of an old and noble Hungarian family. He was in the Presburg diet, 1847-48; lord-lieutenant of Zemplén co.; and led the militia against the Austrians. He was Hungarian envoy to Turkey, and, 1849-57, an exile in France and England. Returning home, he was a member of the diet in 1861, and its vice-president 1865-66. After the recognition of Hungary as a part of the Austrian empire, Deák procured the appointment of A. as prime minister Feb. 17, 1867, and he led a popular and reforming administration, working for the political emancipation of the Jews and against the temporal power of the pope. He succeeded count Beust, Nov. 9, 1871, as minister of foreign affairs, and framed the policy of the so-called Andrassy note for pacificating the revolted provinces of Turkey by forcing the Porte to adopt reforms (1876). He resigned Aug. 18, 1879. He died in Feb., 1890.

ANDRÉ, JOHN, an unfortunate soldier, who met his death under circumstances which have given his name a place in history, was b. in London, in 1751, of Genevese parents. At the age of 20, he entered the army, and soon after joined the British forces in America, where, in a few years, through the favor of Sir Henry Clinton, he was promoted to the important post of adjutant-general, with the rank of major.

Sir Henry Clinton being in treaty with the American Gen. Arnold, who commanded the fortress of West Point, for the betrayal to the British of the fortress, with its magazines, including the whole stock of powder of the American army, confided the conduct of the correspondence on his part to Major A. The secret correspondence was conducted by Arnold and A. under assumed names, and as if it related to commercial affairs; and the treachery was so well concealed, that the Americans had no suspicion whatever of Arnold's fidelity. At last it remained only to settle the time and means of carrying the scheme into execution; and these, it was determined, should be settled in a personal interview between Arnold and A., either because Arnold required such an interview, or, more probably, because Clinton had some misgivings as to the identity of his correspondent. Various projects to bring about the interview having failed, A., at last, on the 20th Sept., 1780, proceeded in a British sloop of war—the *Vulture*—up the Hudson nearly to the American lines. The original design was to have met under cover of a flag of truce, on the pretense of effecting some arrangement as to the sequestered property of a Col. Robinson, a loyalist gentleman who accompanied A., and whose house was at the time Arnold's headquarters; but this design had to be abandoned, and Arnold was obliged to contrive a secret interview. On the night of the 21st Sept., he prevailed on a Mr. Smith, who lived within the American lines, to go to the *Vulture* with a packet for Col. Robinson. Smith went, and returned with A., who passed under the assumed name of Anderson. Arnold met him on the shore, where they conferred some time, after which they went within the lines to Smith's house, and there spent the rest of the night and part of the next day arranging the details of their plan for the treacherous surprisal of West Point. The attack was fixed for the day when the return of Gen. Washington was expected; and there is reason for thinking that part of Arnold's scheme was, if possible, to betray Washington also into the hands of the enemy.

Early on the morning of the 23d Sept., a gun was brought to bear on the *Vulture*, and obliged her to fall down the river so far that A. could not prevail on the boatmen to take him to her, and so was forced to make his way by land to the English lines in a disguise furnished by Smith, and provided with a pass from the general. A. actually got safely within sight of the English lines, when he was stopped and taken prisoner by three American militia-men, to whom, mistaking them for British, he inadvertently revealed the fact that he was a British officer. His captors, on searching him, having discovered concealed in his stockings the plans of West Point and other papers connected with the proposed treachery, which he was bearing from Arnold to Clinton, carried him as a spy to a Col. Jamieson, who, not suspecting anything, was for sending him on to Arnold. Here a chance of escape opened for him, but only for a moment. He was ultimately sent, with the papers found on his person, to Gen. Washington. Jamieson, meantime, having sent word to Arnold of the capture of A., Arnold fled to the *Vulture*, and so saved his life.

A., as a spy taken in the act, was liable, according to the rules of war, to be hanged at once. But considering the rank of the prisoner, and the circumstances, Washington resolved on referring the case to a board of general officers, to report the facts, with their opinion of the light in which the prisoner ought to be considered, and the punishment that ought to be inflicted. The board found that he ought to be considered as a spy from the enemy, and punished with death. Strenuous efforts were made by the British commander to save him. It was represented to Washington that A. could not be regarded as a spy, because—1. He entered the American lines under a flag of truce; 2. That all his movements within the lines were directed by the general. The first plea, on A.'s own authority, was contrary to the fact; and to the Americans it rightly appeared that the point of the offense lay in the communication with the base traitor Arnold. All the efforts of Clinton failed to move the American commander. A. was sentenced to death. On one condition only would Washington spare him—that the British should surrender Arnold. But this they could not think of doing; the sense of honor which, yielding to the spirit of war, offered no opposition to a bargain with Arnold for the blood

and liberties of his compatriots, made it impossible to deliver up the runaway traitor to the death that otherwise awaited the soldier who only went too far in his zeal for his country.

A. suffered death by hanging at Tappan, in the state of New York, on the 2d Oct., 1780, in his 29th year. His death everywhere excited the deepest sympathy. The whole British army went into mourning for him; a monument was erected to his memory in Westminster Abbey, and in 1821 his remains were disinterred at Tappan, and conveyed to a grave near his monument.

Much has been written on the subject of A.'s execution. It has often been maintained, and recently by Lord Mahon, in his *History of England* (vol. vii.), that his sentence was unjust. But a simple narrative of the circumstances, even as they are to be gathered from Lord Mahon's own pages, shows that the American general had no alternative. Indeed, the circumstances cited to show that A. was not a spy, in the ordinary sense, all go to prove that he was a spy of the worst sort. The success of the treachery of Arnold would have been the destruction of the American cause; and it is hard to see how the agent who went secretly within the American lines, and was captured returning in disguise with the information that was to insure that success, is to be held in a better case than the common soldier who steals his way into the enemy's camp of a night, to see the extent of his preparations and forces.

A. was a handsome and amiable man, of considerable accomplishments; he was a good artist, and appears, when in England, to have been known to certain literary circles of his time. These circumstances naturally heightened the feeling with which his fate was regarded.

See *Biographical Dictionary* of the society for the diffusion of useful knowledge, vol. ii.; also, in vol. vi. of the *Memoirs of the Historical Society of Pennsylvania*, 1858, *The Case of Major A., with a Review of the Statement of it in Lord Mahon's History of England*, by Charles J. Biddle—an essay containing a full narrative of the case, with a discussion of all the questions of law and duty raised in connection with it.

ANDRE'A, GIOVANNI, an Italian canonist of the 14th c., of whom many remarkable stories are told, such as his sleeping every night for 20 years on the bare ground with only a bear's skin for covering; and that he had a daughter, Novella, so accomplished in law that she read his lectures in his absence, but who was so beautiful that she read behind a screen lest her face should distract attention from the theme. A. was 45 years professor of canon law at Bologna, where he died of the plague. He was the author of several works on law, but not much is known of his life.

ANDRE'A, PISANO, or **ANDREA DA PISA**, 1270–1345; an Italian sculptor and architect; employed on the Pisa cathedral, on the bronzes of Perugia, and on the façade of the cathedral of Santa Maria del Fiore of Florence. He made for the same church statues of Sts. Peter and Paul and of Boniface VIII., and spent some time in Venice making statues for the front of St. Mark's. Returning to Florence, he was put in charge of all public works. Among his own productions are the bronze reliefs for the gates of the baptistery, which represent incidents in the life of St. John, and which gained him the honorary citizenship of the republic. Among designs by him are the castle of Scarperia, the Venice arsenal, the church of San Giovanni at Pistoia, enlargements for the ducal palace at Florence, towers and gates for the city wall, and a citadel.

ANDREÆ, JAKOB, 1528–90; a German theologian. He studied at Stuttgart and was pastor there in 1549; in 1557, he preached to the Würtemberg court, and attended the diets of Ratisbon and Frankfurt. He was afterwards professor of theology and chancellor in the university of Tübingen and provost of the church of St. George. He took a leading part in Protestant discussions and movements, particularly in the adoption of a common declaration of faith by the two parties. He was one of the secretaries of the conference of Worms. In the latter part of his life he traveled in Bohemia and Germany, working for the consolidation of the reformation, conferring with pastors, magistrates, and princes. He was the author of more than 150 works, nearly all polemical and vigorously written, Lutheran for the most part, and opposed to Calvinism.

ANDREÆ, JOH. VALENT., a very original thinker and writer, b. at Herrenberg, near Tübingen, on the 17th of Aug., 1586. He studied at Tübingen, spent some time in traveling in the s. of Europe, obtained ecclesiastical preferments in the Protestant church of his native country, and d. on June 27, 1654, at Stuttgart, where he was chaplain to the court. Eminently practical in his mental disposition, he was grieved to see the principles of Christianity made the subject of mere empty disputations, and all science and philosophy in like manner perverted by a frivolous scholasticism. To the correction of this prevailing tendency of his age, the efforts of his whole life were directed. His writings are remarkable for the wit and humor, as well as for the learning, acuteness, and moral power which they display. He has been long regarded as the founder, or at least the restorer, of the order of the Rosicrucians (q. v.); and this opinion is plausibly supported by reference to three publications—the *Chymische Hochzeit Christiani Rosenkreuz* (1616), the *Fama Fraternitatis R. C.*, i. e., *roseæ crucis* (1614), and the *Confessio Fraternitatis R. C.* (1615), of the first of which he acknowledged himself the author, and the other two have so much resemblance to it as to be evidently from the same pen. But however these works were misunderstood by his contemporaries, and

particularly by those who were inclined to mysticism in religion, his intention in them was certainly not to originate or promote secret societies of mystics and enthusiasts, but to ridicule the follies of the age. He attacked Rosicrucianism itself in some of his later writings with great severity. Among the best of his works are his *Menippus s. Satyricorum Dialogorum Centuria* (1617). His *Mythologica Christiana* (1619) is another of the best known. He wrote an allegoric poem called *Die Christenburg* (of which an edition was published, Stuttg., 1836), and an autobiography (Winterthur, 1799). Herder has done much to extend a knowledge of A.'s works in the present age.

ANDRÉE, LAURENTIUS, or **LARS ANDERSSON**, 1480-1552; a Swedish reformer and deacon of the cathedral of Upsal. He studied in Rome, but came home a Protestant. He was made chancellor by Gustavus Vasa, who desired him to translate the Bible, in which work he was assisted by Claus Petri. A. was in high favor until he was charged with having neglected to disclose a conspiracy against the king, of which he had knowledge, for which he was sentenced to death. He escaped, however, by the payment of a large sum, and d. peacefully at Strengness.

ANDREA NI, ANDREA, 1540-1623; an Italian painter and engraver on wood, in which art he excelled. Some of the most notable of his works are Titian's *Deluge*, *Pharaoh's Host Destroyed in the Red Sea*, *The Triumph of Cæsar* (after Montegna), and *Christ Retiring from the Judgment Seat of Pilate*. From using a similar monogram his work has sometimes been mistaken for that of Altdorfer.

ANDREE, KARL THEODOR, b. 1808; a German journalist. He was studying at Jena, when he was arrested and tried for revolutionary complicity in 1838, but was acquitted and turned his attention to journalism. His special pursuit was geography, and for many years he edited the *Globus*, a geographical and ethnological publication. Andree paid much attention to the western continent in his *North America*, *Buenos Ayres*, and other works. He d. 1875.

ANDREOSSY, ANTOINE FRANÇOIS, Count, was b. on Mar. 6, 1761, at Castelnaudary, in Languedoc, and was the great-grandson of François A., who, along with Riquet, constructed the canal of Languedoc in the 17th century. He entered the army as a lieutenant of artillery in 1781, joined the revolutionists, rose rapidly in military rank, served under Bonaparte in Italy and Egypt, accompanied him on his return from Egypt to France, and took part in the revolution of the 18th Brumaire. He was ambassador at London during the peace of Amiens, and afterwards at Vienna, was governor of Vienna when it was in the hands of the French after the battle of Wagram, and was for some time ambassador at Constantinople, from which he was recalled by Louis XVIII. on the restoration. He was raised to the peerage by Napoleon after his return from Elba. After the battle of Waterloo, he advocated the recall of the Bourbons; but as deputy from the department of Aube, he generally took part with the opposition. He d. at Montauban on Sept. 10, 1828. He was a man of eminent scientific attainments, and distinguished himself as a member of the institute founded at Cairo. One of his first works was the *Histoire Générale du Canal du Midi* (Par., 1800; new edition, 2 vols., 1805), in which he asserted the right of his great-grandfather to honors long enjoyed by Riquet. Among the most valuable of his works are his *Mémoire sur l'Irruption du Pont-Euxin dans la Méditerranée*, his *Mémoire sur le Système des Eaux qui abreuvent Constantinople*, and his *Constantinople et le Bosphore de Thrace pendant les Années 1812-1814 et pendant l'Année 1826* (Par., 1828), a work of importance in physical geography.

ANDRÉS, JUAN, 1740-1817; a learned Spanish Jesuit, and a teacher of philosophy at Ferrara until the suppression of the college. He wrote much on scientific subjects, on music, art, and teaching the deaf and dumb; but his main work was *On the Origin, Progress and Present State of All Literature*, in Italian. He was keeper of the royal library at Naples, in 1806; became blind in 1815, and retired to Rome.

ANDREW, a co. in n.w. Missouri, on the Kansas border; intersected by the Platte and other streams, and having railroad communication with St. Joseph; 420 sq. m.; pop. '90, 16,000, with colored. The soil produces cereals and tobacco, and coal has been found. Co. seat, Savannah.

ANDREW, the first disciple of Christ, and afterwards an apostle, was, like his brother Peter, a fisherman. Previous to his recognition of Christ as the Messiah, he had been numbered among the disciples of John the Baptist. (See John i. 40, 41.) The career of A., as an apostle, after the death of Christ, is unknown. Tradition tells us that, after preaching the gospel in Scythia, northern Greece, and Epirus, he suffered martyrdom on the cross at Patræ in Achaia, 62 or 70 A. D. A cross formed of beams obliquely placed is styled St. A.'s cross. In the early times of the church, a spurious supplement to the Acts of the Apostles was circulated among certain sects under the title *Acta Andree*. The anniversary of St. A. falls on Nov. 30. St. A. is the patron saint of Scotland; he is also held in great veneration in Russia, as the apostle who, according to tradition, first preached the gospel in that country. In both countries there is an order of knighthood named in his honor.

ANDREW, or **ANDRÁS, I.**, King of Hungary from 1046 to 1058; cousin of St. Stephen, the introducer of Christianity. A. fought with varying fortune against Henry

III. of Germany, and against his own brother, Bela, and was finally defeated by Polish and Hungarian opponents. He d. in 1061.

ANDREW II., 1176-1236; King of Hungary in 1205, after a civil war with his nephew, Ladislas III. In 1217, he conducted an unsuccessful crusade against the Moslem powers. In 1222 he granted the golden bull called the magna charta of Hungary, which confirmed the rights and titles of the bishops and nobles whose revolts had disturbed his reign.

ANDREW III., d. 1301; the last Hungarian king of the Arpad family; grandson of Andrew II.; b. in Venice and succeeded Ladislas IV. in 1290. He had to defend his crown against the pretensions of Rudolph of Hapsburg and pope Nicholas IV., both being claimants, and also against a son of the king of Naples, who claimed to be of the house of Arpad by his mother. His reign was brief and disturbed by rebellion.

ANDREW, JAMES OSGOOD, D.D., 1794-1871; b. Georgia; an itinerant Methodist Episcopal preacher of South Carolina conference, consecrated bishop at Philadelphia in May, 1832. On his social relations began the division of the M. E. church into "North" and "South." His second wife was a slave-holder, and in the general conference of 1844 it was declared that "this would greatly embarrass the exercise of his office as an itinerant general superintendent, if not in some places entirely prevent it," and it was resolved "that it is the sense of this general conference that he should desist from the exercise of this office so long as this impediment remains." The southern delegates protested that the action was extrajudicial and unconstitutional, and the difficulty was finally settled by dividing the churches and property into the northern and southern jurisdictions. Bishop A. adhered to the south, and continued his episcopal work until 1868, retiring then from age. He wrote on *Family Government*, and other subjects.

ANDREW, JOHN ALBION, LL.D., b. Maine, 1818; d. Boston, 1867; a graduate of Bowdoin in 1837. He was admitted to the Boston bar in 1840; practiced there 20 years, and was conspicuous in cases arising under the fugitive slave law. In 1858 he was a member of the legislature; in 1860 he was a delegate in the national convention which nominated Lincoln for president, and was himself elected governor of Massachusetts by the largest vote ever given for a candidate. He foresaw the danger of civil war and took immediate steps to perfect the organization of the militia of his state. Within a week after the first call for troops he sent forward five infantry regiments, a battalion of riflemen, and a battery of artillery. In 1861, and yearly until he insisted on retiring in 1866, he was re-elected governor, and he was in all the war conspicuous for his friendly care of soldiers. He was at the conference of loyal governors in Sept., 1862, and wrote the address presented by them to the president. In religion he was Unitarian; and presided at the first national convention of that denomination in 1865. He declined the offered presidency of Antioch (Ohio) college.

ANDREW, ST., or **THE THISTLE**, a Scottish order of knighthood, named after the patron saint of Scotland. Nisbet, with pardonable partiality, prefers it to all other orders, purely military, "chiefly for the antiquity of it, which gives it a place and precedence over all other orders now in being." (*Heraldry*, part iv. c. xi., p. 107.) He then proceeds, after bishop Lesley, to recount the story of the St. A.'s cross having appeared in heaven to Achais, king of Scots, and Hungus, king of the Picts, as a sign of the victory which they should gain the following day over Athelstane, king of England; and their subsequent vow, when the prophecy was fulfilled, to bear it on their ensigns and banners. It is frequently said to have been recognized as an order of knighthood in the reign of James V., and after a period of abeyance, to have been revived by James II. of Great Britain in 1687. For the actual facts of the case see, however, the article **THISTLE, ORDER OF THE**.

The star of the order of the thistle is worn on the left side. It consists of a St. A.'s cross of silver embroidery, with rays emanating from between the points of the cross, in the center of which is a thistle of gold and green upon a field of green, surrounded by a circle of green, bearing the motto of the order in golden characters.

The badge or jewel is worn pendent to the collar, or to a dark-green ribbon over the left shoulder, and tied under the arm. It consists of a figure of St. A. with the cross enameled and chased on rays of gold; the cross and feet resting upon the ground of enameled green. The collar is of thistles, intermingled with sprigs of rue. By a statute passed in May, 1827, the order is to consist of the sovereign and 16 knights. The letters K.T. are placed after the names of knights of the order. The motto is *Nemo me impune lacessit*.

ANDREW, ST., **THE RUSSIAN ORDER OF**, is the highest in the empire, and was founded by Peter the Great in 1698. It is confined to members of the imperial family, princes, generals-in-chief, and others of like rank. The badge of the order shows on the obverse a cross enameled in blue, bearing a figure of the saint surmounted by a crown, and in the four corners of the cross the letters S. A. P. R. (*Sanctus Andreas Patronus Russiae*). On the reverse is a spread eagle, with the legend (in Russian) *For religion and loyalty*, and the name of the saint. The collar consists of St. A.'s crosses alternating with imperial crowns.

ANDREWS, a co. in Texas, formed 1876; bounded w. by New Mexico; part of Llano Estacado, unorganized and attached to Shackelford for judicial purposes. Area, 1500 sq.m.

ANDREWS, CHARLES BARTLETT, b. Sunderland, Me., 1834; educated at Amherst college. He was a member of the Connecticut senate, 1868-69; of the legislature, 1878; governor, 1879-81; became a judge of the superior court of Connecticut in 1882, and chief Justice in 1889.

ANDREWS, EDWARD GAYER, D.D., b. N. Y., 1825; a graduate of Wesleyan university in 1847. He became a minister in the Methodist Episcopal church in 1848, president of the Oneida conference seminary in 1855, and bishop in 1872.

ANDREWS, ELISHA BENJAMIN, educator; b. 1844; served in the Union army through the civil war; graduated at Brown University in 1870, and at the Newton Theological Institute in 1874; president of Denison University, 1875-79; elected president of Brown University in 1889, and a U. S. commissioner to the Brussels monetary conference in 1892, being a strong supporter of international bimetalism. He published works on history and economics, including *Institutes of American constitutional history*, of general history, and of economics, and *The History of the Last Quarter Century in the United States, 1870-95* (1896).

ANDREWS, ETHAN ALLEN, LL.D., 1787-1858; b. Conn.; a graduate of Yale. He published a number of school-books, and, in 1850, a good Latin-English lexicon.

ANDREWS, JAMES PETTIT, 1737-97; an English historian. He left unfinished a *History of Great Britain, Connected with the Chronology of Europe*, commencing with Cæsar's invasion; the English history on one page and the synchronous European history on the opposite page.

ANDREWS, LANCELOT, an eminent English prelate, was b. in London in 1555, and educated successively at the Coopers' Free School, Ratcliffe, Merchant Taylors' School, and Pembroke Hall, Cambridge, of which college, after having greatly distinguished himself by his industry and acquirements, he was in 1576 elected a fellow. On taking orders, he accompanied the earl of Huntingdon to the north of England. His talents attracted the notice of Walsingham, queen Elizabeth's secretary of state, who appointed him successively to the parsonage of Alton, and the vicarage of St. Giles, Cripplegate. In 1589 he was appointed a prebendary and canon residentiary of St. Paul's, a prebendary of the collegiate church of Southwell, and master of Pembroke Hall. The queen next testified her esteem for his gifts and piety by appointing him one of her chaplains in ordinary, and a prebendary and dean of Westminster. He rose still higher in favor with king James, who was well qualified to appreciate his extensive learning and peculiar style of oratory. He attended the Hampton Court conference, as one of the ecclesiastical commissioners, and took part in the translation of the Bible. The portion on which he was engaged was the first twelve books of the Old Testament. In 1605 he was consecrated bishop of Chichester. In 1609 he was translated to the see of Ely, and appointed one of his majesty's privy-councilors, both for England and Scotland. To the latter country he accompanied the king in 1617, as one of the royal instruments for persuading the Scotch of the superiority of episcopacy over presbytery. In the following year he was translated to Winchester, where he died on Sept. 25, 1626. Bishop A. was, with the exception of Usher, the most learned English theologian of his time. As a preacher, he was regarded by his contemporaries as unrivaled; but the excellent qualities of his discourses are apt to suffer much depreciation in modern judgment from the extremely artificial and frigid character of the style. His principal works published during his life were two treatises in reply to cardinal Bellarmin, in defense of the right of princes over ecclesiastical assemblies. His other works consist of sermons, lectures, and manuals of devotion. Bishop A. was the most eminent of that Anglican school in the 17th c. of which the 19th has seen a faint revival under the name of Puseyism. Its distinctive peculiarities were high views of ecclesiastical authority, and of the efficacy of sacraments, ceremonies, and apostolic succession, and extreme opposition to Puritanism, the 17th c. of which the 19th has seen a faint revival under the name of Puseyism (q.v.).

ANDREWS, LORRIN, 1795-1868; b. Conn., educated at Jefferson and Princeton colleges, and went as missionary to the Sandwich islands in 1827. In 1831 he founded what became the Hawaiian university, in which he was professor. He was long privy-councilor and judge under the native government. He wrote a Hawaiian dictionary, and published part of the Bible in that tongue.

ANDREWS, ST., an ancient city of Scotland, is situated on the bay of the same name, in Fifeshire, about 10 m. from Cupar, and 44 m. from Edinburgh. Tradition dates the origin of this city as far back as the 9th c., when St. Regulus or Rule is said to have taken refuge in this place, then called Mucros, and afterward Kilrymont, bringing with him some of the bones of St. Andrew, which, being enshrined here, continued to be an object of pilgrimage for several centuries. A cave on the sea-shore still bears the name of St. Rule. He would seem to have founded a Culdee monastery, of which the Scottish king Constantine, having resigned his crown, became abbot about the year 940. Probably about the same time, it became the seat of a prelate, who, as "bishop of the Scots," continued to enjoy a certain pre-eminence among the other bishops, until, in 1471, the see was erected into an archbishopric, when he became primate. In the reign of Alexander I., a priory of canons regular was founded at St. A., which afterwards became one of the chief ecclesiastical establishments in Scotland. The last prior was the regent Moray. In 1140 St. A. was created a burgh by the bishop, with consent of king David I. The cathedral, commenced in 1162, and consecrated in 1318, was sacrificed in 1559 to the frenzied zeal of the mob, an outrage which it is customary to attribute to the preaching of Knox. The eastern gable, part of the western, and part of the south side wall and of the transept, are all that remain of this building. It was the second cathedral of St. A..

the first being what is now called St. Rule's church, but was long known as "the old cathedral." Of this interesting little edifice, built between 1127 and 1144, the roofless chancel, and a square tower 108 ft. high, are still preserved. They are in the romanesque style.

The university of St. A., the oldest in Scotland, was founded by Bishop Wardlaw in 1411. It consists of the United College of St. Salvator, founded by Bishop Kennedy in 1456, and St. Leonard, founded in 1512; and St. Mary's college, founded by Beaton in 1537. The education in the latter is exclusively theological. A considerable number of women take university courses. The university has an excellent library, which formerly had a right to a copy of every book published in the kingdom. In lieu of this right it now receives a fixed annual allowance. The castle, once a very extensive and strong building, is now in ruins. It was for some time the residence of Cardinal Beaton, who was assassinated here in 1546. As the ecclesiastical metropolis of Scotland, an ancient seat of learning, and the center of a considerable trade, St. A., at the time of the reformation, was an important and flourishing city. Since that period it has greatly declined in importance; but its excellent educational establishments and convenience as a watering-place still make it an eligible residence for a highly respectable population. Its chief interest is still connected with the past. Here, in the center of the papal jurisdiction in Scotland, the reformation first made its appearance; Scotland's proto-martyr, Patrick Hamilton, suffered here in 1528, and George Wishart in 1546, and here John Knox first opened his lips as a preacher of the reformed faith. The trade of St. A. is inconsiderable. The harbor is difficult of access, and particularly exposed to the e. wind. A few coasters and fishing-boats constitute all the shipping of the port. St. A. is much frequented as a bathing-place, and the game of golf is more practiced than anywhere else in Scotland on the links or downs which stretch along the shore to the n. of the t. for about two miles. The manufacture of golf-balls and golf-sticks is one of its principal industries. Besides its university, St. A. affords singular advantages for cheap and excellent education in the Madras college, established by the well-known Dr. Andrew Bell, which attracts a very large number of pupils. The grammar school and commercial school are incorporated with it. St. A. is a royal and parliamentary burgh, and unites with several smaller burghs in returning a member to parliament. The corporation includes a provost, dean of guild, and four bailies. Pop. in 1891, 6853.

ANDREWS, STEPHEN PEARL, b. Mass., 1812; a student of social science and philology. His writings discussed themes of society, government, and language. Among his works are: *Comparison of the common law with the Roman, French, and Spanish civil law, on entails, and other limited property, in real estate; Love, Marriage, and Divorce; French without a master*; phonographic readers and class-books: and a phonographic reporter. He d. 1886.

ANDBIA, a t. of south Italy, in the province of Bari, 31 m. w. from the t. of Bari. It stands on a plain, and in its vicinity are numerous caverns (*antra*), whence its name. Its cathedral, a fine edifice, was founded in 1046. During the wars of the Parthenopean republic (q.v.), it was besieged by the republican army under gen. Broussier, and being taken after a gallant resistance, was burned, at the suggestion of Ettore Carafa, count of Ruvo, himself its feudal lord. The neighboring country is famous for its almonds, which are a principal article of trade of the city. Pop. 39,493.

ANDRIEUX, FRANÇOIS GUILLAUME JEAN STANISLAUS, a French writer of comedies was b. at Melun, May 6, 1759. In 1798, he was elected deputy of the Seine department, and distinguished himself by his speeches on several points of public interest. In 1800, he was made secretary, and soon afterwards president of the tribunal. From this post he was removed by Bonaparte in 1802, and afterwards devoted himself to literature. During his political career he had written a comedy, *Les Etourdis*, 1787. From 1803 to 1815, he held a professorship in the polytechnic school, and in 1814 was appointed professor in the collège de France. Louis XVIII. gave him a place in the academy in 1813, of which he was made perpetual secretary in 1829. In this position he took an active part in the preparation of the *Dictionnaire de l'Académie*. His most popular dramas were *Molière avec ses Amis*, *Le Vieux Fat*, and the tragedy of *Brutus*. A collection of his æsthetic lectures was published under the title *La Philosophie des Belles-Lettres* (Paris, 1828). He d. May 10, 1833.

ANDRIS'CUS, or PSEUDO PHILIP, a person of mean origin, who claimed to be a son of Perseus, the last king of Macedonia. He was imprisoned in Rome because of this pretense, but escaped and found partisans enough in Thrace to defeat the prætor Juventius, who had been sent against him. After a brief reign of cruelty and extortion he was defeated, 148 B.C., taken to Rome by Q. Cæcilius Metellus, and put to death. But the recapture of Macedonia cost Rome 25,000 men.

AN'DROCLUS, or AN'DROCLES; a Roman slave, perhaps a tamer of wild animals, who led about the streets a lion which had refused to attack him when set loose upon him in the arena. But Aulus Gellius says that A. took refuge from a severe master in an African cave, where came a lion with an injured foot which the slave cured, after pulling out a large thorn, and the grateful animal followed him thereafter. Aulus Gellius relates the story as having come to him from an eye-witness.

ANDROGYNOUS (i.e., male-female; from two Greek words), a term sometimes employed in botany to designate an inflorescence which consists of distinct male and female flowers; and more frequently in zoology in reference to animals which possess a distinct male and female generative system in the same individual. This is the case with very many of the lower kinds of animals, but is not inconsistent with a necessity for the co-operation of two individuals in the propagation of the species. See **HERMAPHRODITE**, **PHYSIOLOGY** and **REPRODUCTION**.

ANDROMACHE, the wife of Hector, was the daughter of king Etion of Thebes, in Cilicia, and is one of the finest female characters in Homer's *Iliad*. During her childhood, Achilles slew her father and her seven brothers. Her love of Hector is pathetically depicted in her address to the hero on his going to battle and her lamentation over his death (*Iliad*, 6 and 24). After the fall of Troy, she was given into the hands of Pyrrhus (son of Achilles), who took her away to Epirus, but afterwards surrendered her to Helenus (Hector's brother), by whom she had a son named Cestrinus. A. is the heroine of one of the tragedies of Euripides.

ANDROMEDA, daughter of the Ethiopian king Cepheus, by Cassiopeia, was, like her mother, remarkably beautiful. When Cassiopeia, with motherly pride, boasted that her daughter was more beautiful than the Nereids, these offended deities prayed Neptune to revenge the insult. Accordingly, the territory of king Cepheus was devastated by a flood; and a terrible sea-monster appeared, whose wrath, the oracle of Ammon declared, could only be appeased by the sacrifice of A. As A. was fastened to a rock, and left as a prey to the monster, Perseus, returning from his victorious battle with Medusa, saw the beautiful victim, and determined to rescue and win her. Having slain the sea-monster, he received A. as his reward. Minerva gave A. a place among the constellations.

ANDROMEDA, a genus of plants of the natural order *Ericæ* (q.v.), distinguished by a 5-valved naked capsule, which splits up through the back of the cells; anthers with two awns, and a globose corolla with the orifice contracted. The species, which are pretty numerous, have very much the general appearance of heaths. Most of them are small shrubs, but some attain a considerable size. The only British species is *A. polifolia*, occasionally found in peat-bogs in different parts of the country, and common throughout the north of Europe and of North America, a small evergreen shrub with beautiful rose-colored drooping flowers. It has acrid narcotic properties, and sheep are sometimes killed by eating it. The shoots of *A. ovalifolia* in like manner, poison goats in Nepal; and similar effects are ascribed to *A. mariana* and other species in the United States.—*A. fastigiata* was observed by Dr. Hooker abounding at great elevations in the Himalaya; a humble shrub, resembling the heather of Scotland. The leaves are used as a substitute for tea. See **SORREL-TREE**.

ANDRONICUS, the name of three Byzantine emperors.—A. I., the son of Isaac Comnenus, was one of the most conspicuous characters of his age, which produced no man more brave, more profligate, or more perfidious. His life was full of extraordinary vicissitudes. During part of his youth, he was a prisoner of the Turks in Asia Minor. He afterwards spent some time at the court of his cousin, the emperor Manuel, and a niece of the emperor became his mistress. He was appointed to a military command in Cilicia; but although his courage, his noble appearance, and his gracious manners made him the favorite of the army, his imprudence and waste of time in dissolute pleasures involved him in defeat. Having engaged in a treasonable correspondence with the king of Hungary and the German emperor, he was thrown into prison by Manuel, and remained there above 12 years; but at last succeeded in making his escape, and, although not without further extraordinary adventures, reached Kiev, the residence of the grand duke Jaroslav. He regained the favor of his cousin by persuading the Russian prince to join him in the invasion of Hungary, and by his gallantry in that war; but incurred his displeasure again by refusing to take the oath of allegiance to the prince of Hungary, the intended husband of Manuel's daughter, as presumptive heir to the empire. He was sent in honorable banishment to Cilicia, where he found a new mistress in a sister of the empress. The resentment of the emperor breaking out against him, he sought refuge in a pilgrimage to Jerusalem. His professions of zeal made his former conduct to be forgotten, and he was invested with the lordship of Berytus; but his profligacy became, if possible, more scandalous than ever in the seduction of Theodora, the widow of Baldwin, king of Jerusalem, who lived with him for years as his mistress. The emperor's anger made Palestine unsafe for him, and he fled with Theodora to Damascus, and finally settled among the Turks in Asia Minor, with a band of outlaws, making frequent inroads into the Roman province of Trebizond; from which he carried away spoil and slaves. Theodora and her children were at last taken and sent to Constantinople, and thither he followed, imploring, with a chain about his neck, and in a form of abject submission, the forgiveness of the emperor, which he obtained, but was sent to Oenoe in Pontus. After the death of Manuel, popular indignation was excited against the empress, who acted as regent for her son, Alexius II., and A. was recalled in 1182 to deliver the empire from her tyranny. He was appointed guardian of the young emperor, and soon after, his colleague in the empire. He caused the empress-mother to be strangled, and afterwards Alexius himself, with whose widow he contracted an indecent marriage. His reign, though short, was vigorous, and restored prosperity to the

provinces; but tyranny and murder were its characteristics in the capital. He set no bounds to the gratification of his revenge against all who had ever offended him, and his jealousy of possible rivals was equally sanguinary. At last, a destined victim, Isaac Angelus, one of his relatives, having fled to the church of St. Sophia for sanctuary, a crowd gathered, and a sudden insurrection placed Isaac on the throne, whilst A., now 73 years of age, was put to death by the infuriated populace, after horrible mutilations and tortures, on Sept. 12, 1185. He was the last of the Comneni that sat on the throne of Constantinople; but the succeeding dukes and emperors of Trebizond were descendants of his son Manuel.—A. II., the son of Michael Palæologus, ascended the throne in 1283; but after a weak and inglorious reign, was driven from it in 1328 by his grandson, A. III., who, after a reign equally inglorious, d. in 1341. During these reigns, province after province was conquered by the Turks.

ANDRONICUS—surnamed **CYRRHESTES** from his birthplace, Cyrrhos in Syria—is said to have erected the octagonal tower called the tower of the winds at Athens, a building of the 3d or 2d c. B.C. It probably received its name from figures representing the eight principal winds, and from a brazen Triton which surmounted it, and showed the direction of the wind—the first known weathercock.

ANDRONICUS of Rhodes, a peripatetic philosopher, lived at Rome in Cicero's time, and employed himself in criticising and explaining the works of Aristotle, a great number of which he was probably the means of preserving to us. None of the writings of A. himself are extant; for the works ascribed to him are probably the productions of *Andronicus Callistos*, a learned Greek of the 15th century.

ANDRONICUS, LIVIUS. See **LIVIUS ANDRONICUS.**

ANDROPO'GON. See **LEMON-GRASS.**

ANDROS, an island of the Greek archipelago, the most northern of the Cyclades, separated from Eubœa by a channel, the Doro channel, 6 m. broad. The island is 21 m. long, and about 8 m. in its greatest breadth. Its eastern coast is very irregular. It is very mountainous, and on some of its mountains snow lies during great part of the year. The soil is very fertile, and wine, silk, wheat, barley, lemons, oranges, and pomegranates are produced. Silk is the chief article of export. The population is supposed to be about 18,000. The chief town, **ANDROS**, is situated on a bay of the eastern coast. It has manufactures of silk and carpets, and a large port, which, however, is suitable only for small vessels. Pop. about 3000.

ANDROS, Sir **EDMUND**, 1637–1714; son of an officer in the English royal household, a major in Prince Rupert's dragoons. In 1674 he was sent to America as governor of the colony of New York, and to him Sir Anthony Colve, the governor during the temporary Dutch supremacy, surrendered without forcible opposition. A. was in more or less trouble with the English colonies over which he claimed authority, and deposed Carteret of East Jersey in 1680. The next year he was called home under accusation, but managed to escape serious prosecution. When the New England colonies were consolidated in 1686, A. was made governor-general with large powers. He was to admit religious toleration, but could suppress all printing, name and change his council at will, and, with their consent, levy taxes and control the militia. Connecticut refusing to obey his orders, he appeared in the council chamber at Hartford, in Oct., 1687, with an armed guard, and demanded the surrender of the colony's charter. Evidence is wanting for the story of the hiding of the charter in the oak tree; a duplicate may have been so hidden, but A. seems to have secured the original document. In 1688 New York and New Jersey were attached to New England and his rule extended over them. On hearing of the revolution in England the people of Boston imprisoned A. and some of his officers, April 18, 1689, and Leisler set up a rebel government in New York. In July, A. and a committee of accusers were ordered to England, but he was acquitted without formal trial. In 1692, he came back as governor of Guernsey in Virginia, where he was popular, retiring in 1698, and becoming governor of Guernsey in 1704–6. In 1691, he published an account of his proceedings in New England.

ANDROSCOG'GIN, a co. in s.w. Maine; 485 sq.m.; pop. '90, 48,968; noted for its water power and manufactures on the two Androscoggin rivers. Agriculture is the main business; dairy products are exported. The Portland branch of the Grand Trunk, the Maine Central, and other railroad lines, traverse the county. Co. seat, Auburn.

ANDROSCOG'GIN, a river in Maine and New Hampshire, rising in Umbagog lake and emptying into the Kennebec above Bath. It is 157 m. long, about half of it in each state.

ANDU'JAR, a t. of Andalusia, Spain, in the province of Jaen, 24 m. n.n.w. from Jaen, on the right bank of the Guadalquivir, at the base of the Sierra Morena. Its streets are irregular, but many of the houses are well built. The river is crossed by an old dilapidated bridge. The situation of the town is unhealthy. The inhabitants are mostly employed in agriculture; but there is some trade in grain, fruit, oil, and cattle, the produce of the neighboring country, and the town is famous for the manufacture of the porous cooling clay water-vessels which are in general use throughout Spain. The convention of Baylen was signed here on 23d July, 1808. Pop. 12,000.

ANDVARI, in Norse mythology, the name of the fish-shaped dwarf who owned the ring, with the curse of ill-obtained gold, fatal to the possessor. This is the key-note of the remarkable stories of Sigurd Fafnisbane and the German legends recently written in music by Wagner in an elaborate trilogy, consisting of "The Rhinegold" (the temptation), the "Valkyrie" (or Fates), "Siegfried" (the hero), and "Die Götterdämmerung" (the "Twilight of the Gods," or end of all things).

ANECDOTE, from the Greek, originally meaning something not published. Procopius called his secret history of Justinian's court *Anecdota*. It is applied also to portions of ancient writings long unpublished, and a number of such *Anecdota* have been collected in volumes and printed. As ordinarily used, A. now means some isolated fact, usually of a personal nature, which would interest a listener. There are a great many books of A., the most celebrated in English being the *Percy Anecdotes*.

ANEGA'DA, the most northerly of the Lesser Antilles, its lat. being about 19° n., and its long. between 64° and 65° w. It contains about 13 sq. m., with a scanty population of little more than 200. It belongs to England. It is of coral formation, being, like most islands of the kind, low and beset by reefs. One reef in particular, which runs out 10 m. to the s.e., is marked, even on ordinary maps, as the scene of numerous shipwrecks.

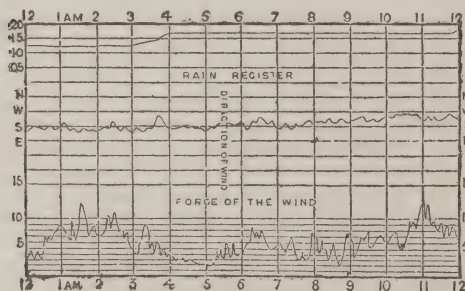
ANEL, DOMINIQUE, about 1679-1730; a French surgeon, inventor of the probe and syringe, bearing his name; skillful in treating aneurism and fistula lachrymalis.

ANEMOMETER (Gr. *anemos*, the wind, and *metron*, a measure; Fr. *anémomètre*, Ger. *Windmesser*), an instrument for measuring the strength and velocity of the wind. The simplest and best A. is that which is generally known as Robinson's hemispherical-cup A. It consists of four hollow hemispheres or cups fixed to the ends of two horizontal iron rods crossing each other at right angles, and supported on a vertical axis which turns freely. The cups revolve with a third of the wind's velocity, and the instrument is so constructed that 500 revolutions are made whilst a mile of wind passes over it. The revolutions are registered by a system of wheels similar to those of an ordinary gas-meter. The difference between two readings gives the number of revolutions passed over during the intervening time, from which the miles can be calculated, and the rate per hour.

The following table gives approximately the relation of the height of the water in the A. to the force and velocity of the wind in winds of different characters. (See AERODYNAMICS.)

	Height of water.	Pressure per square foot.	Velocity per hour.
Feeble wind.....	$\frac{1}{84}$ in.	$\frac{13}{160}$ lbs.	$4\frac{1}{8}$
Fresh breeze.....	$\frac{1}{4}$ "	$1\frac{3}{10}$ "	$16\frac{1}{2}$
Very strong wind.....	1 "	$5\frac{9}{10}$ "	$32\frac{1}{2}$
Tempest.....	4 "	$20\frac{8}{10}$ "	65

Pressure anemometers are of very great importance in meteorological observatories. Of these, the most complete is that invented by Osler. In this instrument, the force of the wind is ascertained in a different way from the hemispherical-cup A. A brass plate one foot square is suspended by means of springs, and being attached to the vane of the instrument, is maintained at right angles to the direction of the wind. This plate, by the action of the wind, is beaten back upon the springs, and in so doing, causes a pencil to move backwards and forwards on a sheet of paper placed below it. This sheet of paper is made to pass under the pencil in a direction at right angles to its oscillation; and by means of clock-work, moves at a uniform rate, so that the force of the wind at any particular time of the day is recorded with perfect accuracy. A pencil in connection with the vane, and moving in the same transverse line as the former, records the changes in the direction of the wind; and a third pencil, guided by a rain-gauge, registers the quantity of rain that has fallen. The preceding sketch, taken from the first half of a daily register-sheet, gives an idea of the kind of record made by an Osler's A. The space between two upright lines indicates an hour; that between two horizontal lines, in the rain-register $\frac{1}{100}$ of an inch of rain, in the direction of the wind two cardinal points, and in the force of the wind 1 lb. of pressure on the square foot.



Register-sheet of an Osler's anemometer.

Thus, on the day in which these lines were traced, there was in the rain-register, brought over from the former account, between .10 and .15 of an inch; and during the 12 h., the pencil had only risen one space, indicating a fall of .05, or $\frac{1}{20}$ of an inch, almost entirely between the hours of 3 and 4 in the morning, and immediately before 12

in the day. If the day had been very rainy, and the pencil had risen to the top of the register, it would have fallen immediately to the bottom of it, and begun a new account; and it might have done so several times in the course of the twelve hours. This would have been effected by the mechanism connected with the rain-gauge, which enables the gauge to empty itself each time that the pencil reaches the top of the rain-register. As regards the direction of the wind, it was, during the first six hours, s., veering slightly towards the e.; and for the last six hours, it was tending decidedly towards the w., being between 10 and 11 nearly west. From the line marking the force of the wind, it will be seen that the day was stormy. Between 1 and 2, and at 11, the wind was blowing a very high gale, producing a pressure of upwards of 12 lbs. on the sq. ft.; and between the hours of 4 and 5, there was a decided lull, the wind being brisk, but not stormy (2 to 3 lbs.). Both the hemispherical-cup A. and the pressure A. are equally indispensable in fully equipped observatories. The former registers the quarterly wind which passes over the place, but cannot register the force of those sudden and almost instantaneous gusts of wind to which storms and hurricanes owe their destructive energy.

In Lind's A., the wind, entering the mouth of one of two upright glass tubes, connected below, depresses the column of water contained in the one tube, and raises proportionately that in the other. This A. is convenient for rough purposes.

ANEMONE, a genus of plants of the natural order *ranunculaceæ*, having an involucre of three divided leaves, more or less remote from the flower, a petaloid calyx, scarcely distinguishable from the corolla, and soft woolly achenia (see **ACHENIUM**), which in some species have tails. The name is originally Greek, and is said to be derived from the word for *wind*, because many of the species love very exposed situations. The species are numerous, and generally beautiful. Most of them flower early in spring. They are natives of temperate and cold climates, chiefly of the northern hemisphere. One species, *A. nemorosa*, the wood A., is a common native of all parts of Britain, and its white flowers, externally tinged with purple, are an ornament of many a woodland scene and mountain pasture in April and May. Another species, *A. pulsatilla*, the pasque flower, adorns chalky pastures in some parts of England at the same season. Its flowers are purple and externally silky. The garden A. is a favorite florist's flower; the varieties are very numerous, and whole works have been published on them and their cultivation, which is most extensively carried on in Holland, and has prevailed from a very early period. It is generally supposed that all these varieties have originated from two species, *A. coronaria* and *A. hortensis* or *stellata*. Both are natives of the Levant; the latter is found also in Italy and the south of France. By cultivation, the size of the flower is increased, its form and colors are modified, and many of the stamens are often changed into small petals, forming a sort of *heart* of the flower. The cultivation of A. requires great attention. It prefers a light soil. The root, which consists of clustered tubers, is taken up after flowering. The plant is propagated by parting the roots, or by seed. In the latter way, new varieties are obtained. Seedling plants do not flower till the second or third year.—Besides the species which have been named, others occasionally appear as ornaments of our flower-gardens. *A. apennina* and *A. pratensis* have beautiful blue flowers. They are both natives of the south of Europe. *A. japonica*, a most beautiful species, has recently been introduced from Japan.—The species of this genus are characterized by the acidity prevalent in the natural order to which they belong; and the rhizomes of *A. nemorosa* and others have been recommended in obstinate rheumatism and in tania.—The genus *hepatica* was formerly included in A. *H. triloba* (*A. hepatica*), with 3-lobed leaves, grows wild in most parts of Germany and throughout the n. of Europe, but is not a native of Britain. It is also found in North America. Varieties of different colors, and both single and double, are among the finest ornaments of our flower-borders in early spring. The plants are very apt to suffer from being removed or having the earth much loosened about them, and must be permitted to remain as much as possible untouched.

ANEMONE, SEA, a popular name of the species of *actinia* (q.v.) and some other *actiniadæ*. It seems to have been first applied to them about a century ago by Ellis, one of the most celebrated investigators of the department of natural history to which they belong, who remarks that "their tentacles, being disposed in regular circles, and tinged with a variety of bright lively colors, very nearly represent the beautiful petals of some of our most elegantly fringed and radiated flowers, such as the carnation, marigold, and anemone." It is only, however, when in their proper element and undisturbed that the sea-anemones expand their tentacula and exhibit their beauty. When left dry by the receding tide, they contract into a jelly-like mass, usually hemispherical or conical, with a puckered hole in the top. The most common of all the British species of sea-A. is the *actinia mesembryanthemum*, which has received its specific name from another floral association. It attaches itself to rocks and stones from low-water almost to high-water mark, and when left by the tide appears as a sub-conical liver-colored or greenish mass, not more than 1 to 1½ in. in diameter, which, when touched, is found to be very smooth and slippery, but of pretty firm consistency. The tentacula, when fully extended, are in length nearly equal to the height of the body, and are nearly of the same color. An azure line frequently encircles the base; and on the base are dark-green lines converging towards the center, and which are formed by radiating vertical plates in the fleshy

substance of the animal, analogous (although not calcareous) to the calcareous partitions in the single-starred madrepores. Around the margin of the mouth there is a circle of azure tubercles, like turquoise beads of the greatest beauty. These are only to be seen when the mouth is pretty fully expanded. They are about 25 in number in full-grown specimens. Their use is not known, though they have been conjectured to be eyes.—A smaller species, *actinia* (or *sagartia*) *troglodytes*—olive-green, with snow-white stripes and numerous tentacula—is pretty common on the British shores, inhabiting holes in the rocks, often the deserted holes of the *pholas*, above which its oval disk and tentacula scarcely rise, and into which it quickly withdraws upon being disturbed. A number of species inhabit holes as this does.—*Actinia* (or *bunodes*) *coriacea*, which attains a diameter of 2 in., attaches itself to sand-covered rocks, and is often much buried in the sand. It is covered with pale perforated warts, which have the power of agglutinating to themselves sand, gravel, fragments of shell, etc.; so that, when the tide is out, the animal is readily passed over by the inexperienced eye as a mere inequality in the surface of the sand, unless some accidental pressure cause it to squirt out water through its tentacula, as, in such circumstances, many of the species are very apt to do, sometimes to the annoyance of those who incautiously meddle with them.—*Actinia* (*bunodes*) *crassicornis* is one of the largest and most beautiful British sea-anemones, being about 4 in. in height, and fully more when expanded between the tips of the opposite tentacula. It exhibits great diversity of the most beautiful colors. Red is usually predominant; the surface of many is variegated with white, or with orange-green and yellow. It occurs almost totally white, cream color, sulphur yellow, and bright scarlet, with pale warts like ornamented beads.—Beauty of color and form are still more abundantly lavished on *actinia dianthus*, a still larger species, with very numerous tentacula, which inhabits deep water.—*Anthea cereus* is, on some parts of the coast, one of the most abundant sea-anemones. Its tentacula are from 120 to 200 in number, are longer than in the *actiniæ* generally, and are incapable, it is said, of being retracted, as in the true *actiniæ*, but remain constantly expanded, and are almost never completely at rest.

Of all the species, *actinia mesembryanthemum* is perhaps the most easily kept in the aquarium. It not unfrequently changes its place, and its locomotion is an interesting subject of observation. It will subsist for a considerable time without supplies of food, but readily accepts morsels of beef or mutton, fish, or almost any kind of animal food. The tentacula with which the offered food first comes in contact attach themselves to it; those next to them are in motion, as if to support them, if necessary, and a sort of sympathy seems to extend even to the most remote; but except in the case of struggling prey, or of a very large morsel, only a small number of the whole tentacula are usually employed in conveying the food into the mouth, or, more properly, into the stomach, for they do not seem to part from it till they have fairly lodged it there.

Sea-anemones are extremely voracious, and almost every observer has his own anecdotes to illustrate it. Dr. Johnston relates one which at the same time remarkably illustrates their power of reproducing organs of their own body. "I had once brought to me a specimen of *act. crassicornis*, that might have been originally 2 in. in diameter, and that had somehow contrived to swallow a valve of *pecten maximus* of the size of an ordinary saucer. The shell, fixed within the stomach, was so placed as to divide it completely into two halves, so that the body, stretched tensely over, had become thin and flattened like a pancake. All communication between the inferior portion of the stomach and the mouth was of course prevented; yet, instead of emaciating and dying of an atrophy, the animal had availed itself of what undoubtedly had been a very untoward accident, to increase its enjoyments and its chances of double fare. A new mouth, furnished with two rows of numerous tentacula, was opened up on what had been the base, and led to the under-stomach: the individual had indeed become a sort of Siamese twin, but with greater intimacy and extent in its unions." (*British Zoophytes*, i. 235.)

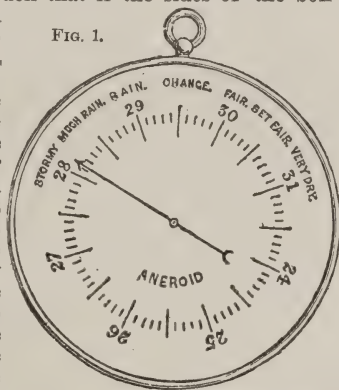
As inmates of the aquarium, sea-anemones are apt to prey upon their fellow-prisoners. "Simple contact of the tentacula," says Sir J. G. Dalyell, "is the prelude of destruction. Some animals, as if conscious of their inevitable fate, seem paralyzed by the touch and yield without a struggle. Others, whose size and strength should insure indemnity, are held in the relentless grasp; the tentacula crowding faster and faster around, until the victim is speedily swallowed alive." There appears to be in other marine animals an instinctive horror of the tentacula of the sea-A. The hermit-crab will instantaneously flee out of its shell, if the shell is caught by them. It is now believed that, like the *acalephæ* (q.v.) and the *hydras* (q.v.), the sea-anemones possess a power of benumbing their prey. Sea-worms (*neræides*) have been observed first to writhe, and then to become paralyzed. Little elliptical capsules are in some species scattered over the whole surface of the body; in others, confined to the tentacula, or even to their tips. These are furnished with spicula or minute spears, by which it is probable that not only are wounds inflicted, but poison is also conveyed into them. The sensations produced by the touch of the tentacula appear to be very different in the case of different persons, from a mere "rasping feeling" on the withdrawal of the hand, to a slight tingling and even to a stinging as by a nettle. The *anthea cereus* possesses the stinging power in a much greater degree than the ordinary *actiniæ*. Probably the skin of the human hand is in general too thick or hard to be pierced by their fine spicula. Dr. A. Waller of Birmingham dis-

covered that, on submitting the tip of his tongue to the tentacula, a pungent pain and stinging, as by a nettle, were the constant result. He also found that a thin India-rubber membrane grasped by the tentacula retains the microscopic "poison darts" sticking on its surface. Some of these are only two or three times the length of the capsule which contains them, or at most 100th part of an inch; but others are much longer, and when within the capsule, are coiled up after the manner of a watch-spring. The capsules are therefore called *filiferous* or *thread capsules*. This thread is highly elastic, and the expulsion of it, as of the shorter spicula, is effected, Mr. Gosse tells us, by organs having this for their special office.

ANEMOSCOPE, a vane or weathercock, or any instrument which shows the direction of the wind; often with a spindle attachment that turns an index or a compass scale in a room, showing within a house the course of the wind. Latterly the A. has been made self-recording, and now in most observatories needs no watching, every movement of the wind being written down; the force or pressure and the velocity in miles per hour being also recorded. This is done by pencils which press lightly upon a cylinder covered with a sheet of paper divided into horizontal hour lines, the lines moving at the rate of half an inch an hour, a complete revolution of the cylinder occupying 24 hours. Lines marked by the pencils show by their relation to the graduated lines the direction of the wind at any moment of the day.

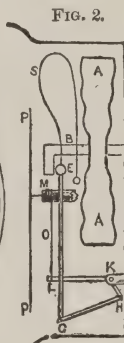
ANEROID (formed in an anomalous way from Gr. *a*, priv., and *nēros*, wet), the name given to a barometer invented by M. Vidi of Paris, in which the pressure of the air is measured without the use of liquid, as in ordinary instruments. The face of the A. barometer, represented in fig. 1, has a diameter of about 5 in., and the case behind, which contains the mechanism, a general idea of which is given in fig. 2, is about 2 in. deep. The pressure of the atmosphere acts upon a circular metal box, AA, about 3 in. in diameter, and $\frac{1}{2}$ of an inch deep, which has been nearly exhausted of air, and then soldered air-tight. The sides are corrugated in concentric rings, so as to increase their elasticity, and one of them is fixed to the back of the brass case which contains the whole. The amount of exhaustion is such that if the sides of the box were allowed to take their natural position, they would be pressed in upon each other, and to prevent this they are kept distended, to a certain extent, by a strong spring, S, fixed to the case, which acts upon the head of the stalk, B, attached to the side next the face. When the pressure of the air increases, there being little or no air inside the box to resist it, the corrugated sides are forced inwards, and when it diminishes again, their elasticity restores them to their former place; and thus the little box becomes a spring extremely sensitive to the varying pressure of the external atmosphere. Supposing the two sides pressed inwards, the end of the spring, E, will be drawn towards the back of the case, and carry with it the rod, EG, which is firmly fixed into it. EG, by the link GH, acts on the bent lever, HKL, which has its axis at K, so that, while the arm, KH, is pushed to the right, LK is moved downwards. By this motion, a watch-chain, O, attached at L, is drawn off the little drum, M, and the index-hand, PP, which is fixed to it, would move from the position represented in fig. 1 to one towards the right. When the contrary motion takes place, a hair-spring moves the drum and the hand in the opposite way. By this mechanism, a very small motion of the corrugated sides produces a large deviation of the index-hand, $\frac{1}{2}$ of an inch causing it to turn through 3 inches. The A. barometer is graduated to represent the inches of the mercurial barometer. Both from its small size and construction, it is extremely portable, and consequently a very useful instrument; but from its liability to change from time to time, it must be frequently compared with the mercurial barometer. The "metallic barometer" of M. Bourdon is a modification of the A. principle.—See BAROMETER.

FIG. 1.



Aneroid barometer.

FIG. 2.



ANEURIN, a Welsh poet (603), who according to the received account was the son of Caw ab Geraint, the chief of the Otadini; whilst others have identified him with Gildas the historian, and Mr. Stephens, the translator of his poem, makes him Gildas's son. He was present at the battle of Cattraeth as bard and taken prisoner. After his release he returned to Llancarvan and later in life lived at Galloway. He is said to have perished at the hands of Eidyn ab Einryan. His epic poem Gododin, which in its present form contains over 900 lines, tells of the defeat of the Britons by the Saxons at Cattraeth, but the obscurity of the language has made it impossible to gain from it a clear account of the defeat, and it has even been maintained that the subject of the poem is the massacre of the Britons at Stonehenge (472). The Gododin was published with an English version and notes in 1852 by Rev. J. Williams ab Ithel, and the text appears with a translation

in F. Skene's *Four Ancient Books of Wales* (1866). The Cymmrodorion Society published, in 1855, a new edition, with translation by the late Thomas Stephens.

ANEURISM (Gr. *aneurysma*, a dilatation) is a pulsating tumor consisting of a sac or pouch into which blood flows through an opening in an artery. The sac of an arterial A. may be formed in the first instance by one or more of the tunics of the vessel, generally the outer one, the two inner having given way. This is called a *true A.*, in contradistinction to the *false*, in which the sac is formed of cellular tissue condensed by the blood flowing into it after a wound has been inflicted on the artery from without. Should the sac give way, and the blood escape among the tissues, the A. is said to be diffused. Varicose A. is when the sac communicates both with an artery and a vein; aneurismal varix, when these vessels communicate without any sac intervening; both of these are generally the results of bleeding being performed by non-professional persons. Aneurisms prove fatal by their pressure on some important part, or by bursting and allowing a sudden escape of blood. They are cured by the deposit, within the sac, of fibrin from the blood—a result the surgeon can promote by obstructing the artery above the A. by compression or by ligature; applying the latter close to the sac, if the A. is of the “false” variety, but at a distance, if it is the result of disease. Internal aneurisms are treated by those remedies which moderate the heart's action, as digitalis, etc.

ANGEIOLEUCITIS. See ADENITIS.

ANGEL, an ancient English gold coin, varying in value from 6s. 8d. to 10s. It was so called from the figure of the archangel Michael piercing the dragon upon its obverse. A. continued to be coined down to the time of the Commonwealth.

ANGEL-FISH, *Squatina angelus*, a fish common on the southern coasts of Britain, and remarkable for its extreme ugliness. On some parts of the coast, it is called *monks' fish*. It is very nearly allied to the sharks, and was included by Linnæus in the genus *squalus*. See SHARK. It is very voracious, preying chiefly upon fishes. It attains a length of 7 or 8 ft.; and the body is broad and flattened horizontally. The head is nearly round, and broader than the body, from which it is separated by a very distinct neck; the mouth is extremely large, and at the extremity of the snout; the eyes are on the upper part of the head, and are very small; behind the eyes are large spout-holes; the skin is very rough, and covered with tubercles. The upper parts are of a gray color; the under parts, dirty white. The female is said to produce seven or eight young in spring and autumn.

ANGELICA, a genus of plants of the natural order *umbelliferae* (q.v.), by some botanists divided into two; *A.*, and *archangelica*. The species are mostly herbaceous and perennial, natives of the temperate and colder regions of the northern hemisphere. They have bipinnate or tripinnate leaves. WILD *A.* (*A. sylvestris*) is a common plant in moist meadows, by the sides of brooks, and in woods in Britain and throughout many parts of Europe and Asia. The root is perennial, short, ringed, and branched; it is white within, and contains a yellow milky juice. The stem is hollow, 1½ to 5 ft. high, often flecked with red; the umbel is convex. GARDEN *A.*, *A. archangelica* or *archangelica officinalis*, is a biennial plant, becoming perennial when not allowed to ripen its seeds. It has greenish flowers in almost spherical umbels. The stem is as high as a man. The fruit is long and straw-colored. The root is long and fusiform, an inch or more in thickness, with thick irregular rugose radicles. The whole plant, and especially the root, is aromatic and bitter, containing much resin and essential oil. The root is admitted into the pharmacopeia as an aromatic stimulant and tonic, and is used in nervous ailments, and in indigestion and flatulence. It is very little used in Britain. The root of *A. sylvestris* is sometimes substituted for it, but is much weaker.—The garden *A.* was at one time much cultivated for the blanched stalks, which were used as celery now is; but its cultivation for this purpose has long been almost entirely discontinued. The tender stalks and midribs of the leaves, candied, are still, however, a well-known article of confectionery, and an agreeable stomachic; the roots and seeds are employed in the preparation of gin and of “bitters.” The plant is a very doubtful native of Britain, but is common in many parts of Europe, and even in Lapland and Iceland. The Laplanders not only use it as food, but regard the stalks roasted in hot ashes as an efficacious remedy in pectoral disorders.—The powdered seeds of the wild *A.* are used by the country people in some parts of Europe to kill lice. Several species of *A.* are natives of North America.

ANGELICA TREE. See ARALIA.

ANGELIC HYMN, another name for the *Gloria in Excelsis*. See GLORIA.

ANGELICO, FRA. See FIESOLE.

ANGELINA, a co. in e. Texas; 880 sq.m.; pop. '90, 6306, with colored. It is heavily timbered with a great variety of trees. Corn, cotton, sugar-cane, rice, and tobacco are produced. There are steam mills, and petroleum is found. Co. seat, Homer.

ANGELL, JAMES BURRILL, LL.D., b. R. I., 1829. In Sept., 1845, he entered Brown university, and graduated four years later. In 1851 he went to Europe, where he spent

two years in study and travel. He returned to accept the chair of modern languages and literature in the university of which he was a graduate, a position which he filled for seven years. He was the editor of the Providence *Daily Journal*, from 1860 to 1866, when he was appointed to the presidency of the university of Vermont. In 1871 he became president of the university of Michigan, at Ann Arbor. In March, 1880, he was appointed minister to China; was a member of the U. S. Fishery Commission in 1887, and of an international commission on the building of canals to enable ocean steamers to pass from the Atlantic to the Great Lakes. He is the author of many articles in the *North American Review*, and other magazines.

ANG'ELL, JOSEPH KINNICUT, 1794-1857; b. R. I.; a graduate of Brown university in 1813. He was a writer on law; edited a law journal in 1828-31; and was for years a reporter for the Rhode Island supreme court. He was author of a treatise on the laws of property, and at his death was engaged on a treatise on the *Law of Highways*, which was completed by Thomas Durfee. Lord Brougham praised A.'s work on *Limitation of Actions*.

ANGELO, MICHAEL. See MICHAEL ANGELO.

ANGELOLOGY, the current belief of a people or period concerning angels (q.v.).

ANGELS (Gr. messengers), in Jewish and Christian theology, a class of superior spirits, represented as the immediate instruments of Divine Providence. As Scripture contains no complete and systematic account of angels, the belief of the church respecting them, except in a few points, has never been exactly defined. It has always been held that A. and human souls, notwithstanding the high origin of the latter, are distinct; only Dionysius Areopagita (q.v.) and a few modern speculators have maintained the contrary. Dionysius, in his *Hierarchy Celestis*, divides A. into nine orders. Whether there are not spirits superior both to men and A., has been a disputed point. As to the number of A. and their names, the church in the middle ages repeatedly checked the tendency to go beyond the usually received accounts; a Roman council, in 745 A.D., mentions with reprobation the use of the unwonted names of Uriel, Raguel, Simiel, etc. The names that have all along been in most common use are Michael, Gabriel, and Raphael.

The creation of the A. was placed, by the Platonizing church-fathers, before that of the material world; others assigned it to some one of the six days. Equally various were the opinions as to the nature of the A. The second synod of Nice (787) assigned them a subtle, ethereal, or fire-like body; the scholastics, on the other hand, and the Lateran council of 1215, maintained their immateriality; while others, owing to the appearing of A., mentioned in Scripture, attributed to them the power of assuming momentarily the corporeal form. The poet Nonnus (lived in Egypt in the 5th c.) is the first to speak of angels' wings.

The belief in *guardian A.* was common both to heathen and Jews, and had been reduced to system by Philo; and the doctrine was adopted in the Christian church, and defended by Origen and others, founding on Matthew xviii. 10, and Acts xii. 15. It has been cherished by many in all ages and of all parties, but has never been decided on by the church. Some of the fathers also spoke of good and bad guardian-angels, the former of whom were always ready to prompt to good actions, and to avert evil, while the latter were equally quick in bringing about mischief, wickedness, and calamity. From the belief in the guardianship of A., and their participation in the government of the world, arose naturally the early practice of invoking and worshipping them. Many Christian teachers condemned it, appealing to Colos. ii. 18; and the council of Laodicea, 300, called it disguised idolatry. But after the council of Nice had conceded that though A. were not to receive divine worship, they might receive reverential obeisance, the practice mentioned became more and more rooted, and continues in the Greek and Roman Catholic churches to this day.

ANGELUS BELL, THE, is rung in all Catholic countries morning, noon, and night to invite the faithful to the recitation of the angelic salutation. Formerly the hour for the ringing of the *Angelus* was at sunrise, noon and sunset, but it is now more generally heard at the appointed hours of noon, and six o'clock both morning and evening. The bell receives its name from the title given the prayer recited at this time, *Angelus Domini*, also called *Ave Maria* (q.v.).

Two peasants who are performing their devotions in the open field, where the sound of the *Angelus* reaches them at the sunset hour, are the subject of the famous painting by Millet (q.v.).

ANGELUS DOMINI, the name of a brief prayer repeated by Roman Catholics at the sound of the *Angelus* bell at sunrise, noon, and sunset.

ANGER is displeasure or vexation accompanied by a passionate desire to break out in acts or words of violence against the cause of the displeasure; which must, of course, be a sentient being, capable of feeling the infliction. Like most other emotions, it is accompanied by effects on the body, and in this case they are of a very marked kind. The arterial blood-vessels are highly excited; the pulse, during the paroxysm, is strong and hard, the face becomes red and swollen, the brow wrinkled, the eyes protrude, the whole body is put into commotion. The secretion of bile is excessive, and it seems to assume a morbid consistency. In cases of violent passion, and especially in nervous persons, this excitement of the organs soon passes to the other extreme of depression; generally

this does not take place till the A. has subsided, when there follows a period of general relaxation. The original tendency to A. differs much in individuals according to temperament; but frequent giving way to it begets a habit, and increases the natural tendency.

From the nature of A. it is easy to see that it must be—often at least—prejudicial to health. It frequently gives rise to bile-fever, inflammation of the liver, heart, or brain, or even to mania. These effects follow immediately a fit of passion; other evil effects come on, after a time, as the consequence of repeated paroxysms—such as paralysis, jaundice, consumption, and nervous fever. The milk of a mother or nurse in a fit of passion will cause convulsions in the child that sucks; it has been known even to occasion instant death, like a strong poison.

The controlling of A. is a part of moral discipline. In a rudimentary state of society, its active exercise would seem to be a necessity; by imposing some restraint on the selfish aggressions of one individual upon another, it renders the beginnings of social co-operation and intercourse possible. This is its *use*, or, as it is sometimes called, its final cause. But the more social intercourse comes to be regulated by customs and laws, the less need is there for the vindictive expression of A. It seems an error, however, to suppose that the emotion ever will be—or that it ought to be—extirpated. Laws themselves lose their efficacy when they have not this feeling for a background; and it remains as a last resource for man, when society, as it does every now and then, resolves itself into its elements. Even in the most artificial and refined states of society, those minor moralities on which half the happiness of social intercourse depends, are imposed upon the selfish, in great measure, by that latent fund of A. which every man is known to carry about with him.

ANGERBO'DA, in Norse mythology, a giantess, mother of Fenrir, the monster wolf which, at the last day, is to swallow and conquer Odin, or the Sun.

ANGERMANNLAND (Swedish *Ångermanland*, pronounced Ongermanland), a former division of Sweden, now chiefly comprised in the län of Westernorrland, extends along the Gulf of Bothnia, and is watered by the river Angermann. It exhibits great variety of wild and beautiful landscape—wood, mount, stream, and lake; vieing with the banks of the Rhine, the Danube, or the far-famed scenery of Switzerland. In addition, it is one of the best cultivated districts in Sweden, producing barley, rye, and pease, and abounding in excellent pasturage. The river Angermann, in its lower course, becomes navigable for the largest ships, and broadens out into a lake shortly before discharging itself into the gulf of Bothnia. The inhabitants are reckoned among the solidest of the Swedes, and are favorably known for their sobriety and industrious habits, on account of which, prosperity is general. The chief town of the district is Hernösand, with a population of about 5800, standing on the small island of Herno, and having steam communication weekly with Stockholm. It is the see of a bishop, has a cathedral, school, and literary and printing establishment with Lappish type, public baths, and building docks. It exports linen fabrics, and the Baltic products generally.

ANGERMÜNDE, a t. in Prussia, capital of a circle of the same name in the province of Brandenburg, 43 m. from Berlin by railway. Pop. about 6500. The chief industry is the manufacture of woolen and linen goods.

ANGERS, the ancient *Juliomagus* or *Andegavum*, formerly the capital of the duchy of Anjou, and now of the French department of Maine-et-Loire, is situated on both sides of the navigable river Mayenne, not far from its junction with the Loire, lat. 47° 28' N., long. 0° 33' W. A. is the see of a bishop, and was the seat of a university founded in 1246; instead of which it has now an academy of the highest class. Lord Chatham and the duke of Wellington received a portion of their education at the military college which was once here, but which is now removed to Saumur. It has also given birth to two distinguished men, Bernier, the traveler, and David, the sculptor. It has also a theological seminary, an institution for the deaf and dumb, a botanical garden, a large picture-gallery, and a public library. The ruins of the ancient castle of A., built by St. Louis, about the middle of the 13th c., are situated on a projecting rock above the river. The cathedral of St. Martin is a fine building of the 9th c., in the Roman basilica style. Sail-making, cotton-spinning, stocking-weaving, etc., are carried on to a considerable extent, and a trade in corn, wine, brandy, flax, hemp, honey, etc. There are slate quarries in the neighborhood. Pop. '96, 77,164.

ANGHIA'RI (anc. *Castrum Angulare*), a town of Central Italy, in the province of Arezzo, Tuscany, 10 m. n.e. from Arezzo, on the slope of a hill near the Sovarà, one of the head-waters of the Tiber. In 1440, a battle was fought here, in which the Milanese were defeated by the Florentines. Pop. of commune, 6941.

ANGHIERA, PIETRO MARTIRE, D' (PETER MARTYR), 1455-1526; an Italian historian. He became a priest in Spain in 1488; in 1501 he was on a mission of state to Egypt, and in 1505 was prior of the church of Granada. He was a member of the council of the Indies. His works are important; the *Opus Epistolarum* records almost every event of consequence from 1488 to 1525, and *De Rebus Oceanis et Orbe Novo* is a valuable account of the new-world discoveries, taken from the lips and reports of Columbus and other early navigators.

AN'GILBERT, SAINT, secretary and friend of Charlemagne, and the most distinguished poet of his age. He filled the highest offices, and married the great monarch's daughter Bertha; he afterward retired from public service and became abbot of a monastery, returning from time to time as the state required his services. In 800 he assisted in Rome at the coronation of the emperor, who called him the "Homer of the age." He died in 814.

ANGINA PECTORIS, or **HEART-STROKE**, is characterized by intense pain and sense of constriction, which occur in paroxysms beginning at the breast-bone, or deep in the chest, and extending towards the left shoulder. The fits recur, and the patient either dies in one of them, or from effusion of fluid within the chest.

A. P. rarely occurs before the 50th year, and is caused by some defect in the vascular or nervous supply of the heart itself; but the exact seat of the disease has not yet been ascertained, and, indeed, probably varies with the individual. The paroxysms are induced by any excess in diet, by exertion, as walking uphill or against a boisterous wind, or by mental emotions. As, during the paroxysm, but little can be done, "whoever is subject to fits of the heart-stroke, should studiously shun all occasions of having his feelings roused or his passions warmly interested. If he is prone to anger, he must either endeavor to restrain his passion, or must withdraw from scenes likely to awaken it. If he feels keenly contradiction, disappointment, or insult, he had better avoid all disputes in which he may meet either one or the other. He must lead a sober, quiet, and temperate life, in which neither the emotions of the soul are to disturb the functions of the body, nor corporeal affections are allowed to disturb the serenity of the mind."—*Craigie*.

ANGIOSPERMOUS (from the Gr. *angeion*, a vessel, and *sperma*, seed), a term in botany, applied to phanerogamous plants which have their seeds inclosed in a pericarp. This is the case with the greater part of phanerogamous plants. Those which have the seeds naked, as the *coniferae* (q.v.), are called *gymnospermous*. In the Linnæan system, one of the two orders of the class *didynamia* is called *angiospermia*.

ANGLAISE, an English country-dance (*contre danse*), in 2-4, 3-4, or 3-8 time. It is gay, and probably originated in the older form of the French *Rigadoon* (q.v.).

ANGLE (from Lat. *angulus*, a corner) means, in geometry, the opening or inclination of two lines that cut or meet one another. If the lines are straight, the A. is *rectilinear*. The magnitude of an A. depends, not upon the length of the lines or legs, but upon the degree of their opening. If the legs are supposed closed, like a pair of compasses, and then gradually opened till they come into one straight line, they form a series of gradually increasing angles; when half-way between shut and straight, they contain a *right* A. Any A. less than a right A. is called *acute*, and one greater is called *obtuse*. Angles are measured by degrees, of which a right A. contains 90. The A. made by two curved lines (*curvilinear*) is the same as the A. made by the tangents to the two curves at the point of intersection. Angles made by planes with one another can also be reduced to rectilinear angles. When three or more planes meet at the same point, the angular space included between them is called a *solid* A.

The **FACIAL ANGLE**, on which Camper founded a scheme for estimating the degrees of intellect and sagacity bestowed by nature on the several members of the animal kingdom, was measured by him in the following way: One straight line was drawn from the ear to the base of the nose, and another from the prominent center of the forehead to the most advancing part of the upper jawbone, the head being viewed in profile. "In the angle produced by these two lines," says the physiologist, "may be said to consist not only the distinction between the skulls of the several species of animals, but also those which are found to exist between different nations; and it might be concluded that nature has availed herself at the same time of this angle to mark out the diversities of the animal kingdom, and to establish a sort of scale from the inferior tribes up to the most beautiful forms which are found in the human species. Thus it will be found that the heads of birds display the smallest angle, and that it always becomes of greater extent in proportion as the animal approaches most nearly to the human figure. Thus there is one species of the ape tribe in which the head has a facial angle of 49°; in another animal of the same family, which is one of those *simia* approaching most closely to the human figure, the facial angle contains exactly 50°. Next to this is the head of the African negro, which, as well as that of the Kalmuc, forms an angle of 70°, while the angle discovered in the heads of Europeans contains 80°. On this difference of 10° in the facial angle the superior beauty of the European depends; while that high character of sublime beauty which is so striking in some works of ancient statuary—as in the head of the Apollo and in the Medusa—is given by an angle which amounts to 100°."

ANGLE, DEAD. In fortification, where an angle of the wall is so formed that a small plot of ground in front of it can neither be seen nor defended from the parapet. it is called a "dead angle." See **BASTION**, **CURTAIN**, **FORTIFICATION**.

ANGLER, *Lophius piscatorius*, a fish not uncommon on the British shores, and sometimes called the *fishing-frog*, sometimes, from its ugliness and voracity, the *sea-devil*.

It usually attains the size of about 3 ft. in length, sometimes 5 ft. The head is enormously large, depressed, and spinous; the mouth is of similar proportions (whence the Scottish name *wide gab*), and furnished with many sharp curved teeth. The lower jaw is considerably longer than the upper. The body is narrow in comparison with the great breadth of the head, and tapers rapidly to the tail. The whole fish is covered with a loose skin, almost without scales. There are two dorsal fins, which are spinous, and three anterior rays, regarded as belonging to the first dorsal, are free and articulated to the head, which are with great probability supposed to serve the animal as delicate organs of touch. The nostril tube is elongated into a membranous stalk, capable of spreading out like a cup at the upper end, and of being moved in every direction by a very numerous set of muscles, the bottom of the cup being divided into projecting leaflets, on which the olfactory nerve is finally distributed. There are also numerous worm-like appendages about the mouth, and by means of these, and still more of the filaments which rise from the upper part of the head, the creature is supposed to attract small fishes, upon which it seizes. The wonderful stories told upon this point seem to require authentication, yet they are in themselves by no means incredible, and have been current concerning this fish and its congeners since before the days of Aristotle, who mentions them, and says that this fish is called a *fisher* because of the means by which it procures its food. Yarrell justly remarks of the stratagem ascribed to the *lophius*, that it is not more wonderful than that of spiders, which spin and repair their webs to catch insects, upon which they subsist.—The genus *lophius* belongs to a family of acanthopterygious fishes called *lophiadæ* or *lophioids*, and by Cuvier *pectorales pedunculati*, remarkable for the elongation of the carpal bones, so as to form a sort of wrist, to the extremity of which the pectoral fin is articulated; so that, by means of it, these fishes are able to leap suddenly up in the water to seize prey which they observe above them; and some of them can hop about upon sea-weeds or mud from which the water has retired. They do not suffer so quickly as most other fishes from being out of the water, their gill-opening being very small, and an *A.* has been often known to devour flounders or other fish which have been caught along with it. The bones are much softer than those of acanthopterygious fishes in general.

ANGLES (*Angli*), a German tribe of the race of the *Suevi*, who seem originally to have occupied the country lying on the e. of the Elbe, between the mouths of the Saale and the Ohre, and, moving northwards, to have settled in Schleswig, between the Jutes and the Saxons. Along with the latter the *A.* passed over in great numbers to Britain, during the 5th c., and ultimately established there the Anglo-Saxon (q.v.) kingdoms of the heptarchy. From them England derives its name (Lat. *Anglia*, Anglo-Saxon *Engla-land*). After these migrations from Schleswig, the Danes from the north entered the deserted districts, and mingled with the *A.* who remained there. The German language and manners were afterwards introduced by immigrant nobles from Holstein, and prevailed among the higher classes; but to the time of Christian VI., the Danish was still generally spoken by the common people. During the present century, the German has more completely gained the ascendancy. The modern Angles are of a more passive disposition than the Frieslanders and the people of the Dithmarsch, and religious sentiment is very strongly manifested among them. The district called *Angeln* extends from the Schlei on the s., to the Flensburg hills on the n., contains about 330 sq. m., and a pop. of about 50,000. The name has no political or administrative signification.

ANGLESEA, ARTHUR ANNESLEY, Earl of, 1614–86; lord privy seal in the reign of Charles II. He was educated at Oxford, and studied law at Lincoln's Inn. He was sent as commissioner to Ulster in 1645 to oppose the designs of the rebel Owen Roe O'Neil. After the death of Cromwell he was president of the council of state, and concerned in bringing about the restoration. He succeeded to his father's titles in 1640. *A.* was a man of great abilities and extensive learning, well acquainted with the constitution and the laws of England, and the author of several works of a political and polemical character.

ANGLESEA, or ANGLESEY, HENRY WILLIAM PAGET, first marquis of *A.*, b. May 17, 1768, was educated in Oxford, and, as Lord Paget, entered the army at the beginning of the French revolution. From 1793 to 1794 he commanded a volunteer corps in Flanders, and subsequently acquired a high reputation as a cavalry officer in the peninsular war, especially during the retreat under Gen. Moore. At the battle of Waterloo, where he commanded the British cavalry, he lost a leg. On his return to England, he received a vote of thanks from parliament, and was made marquis of *A.* Afterwards, he took a part in the administration under Canning, and in 1828 was appointed lord-lieutenant of Ireland, at a period when that country was greatly agitated on the question of its religious privileges. He at first opposed the emancipation of the Catholics; but ultimately became convinced that it was essential to the peace of the country, in consequence of which he was recalled from Ireland by Wellington in 1829. He was again appointed to the same office under Lord Grey's administration in 1831; but the perverse policy of the tories had involved matters in such perplexity that even the decisiveness and integrity of his character could not allay the irritation. O'Connell had now commenced his ruinous career of agitation, and the marquis was compelled to resort to severe coercive measures, which destroyed the popularity he had previously acquired.

His rule in Ireland was not characterized by any superior statesmanship; but it ought to be remembered, to his honor, that he founded the Irish board of education, which has been of immense service to that nation. In 1833, he was succeeded by the marquis of Normandy; but did not again take any prominent part in public proceedings till 1846, when he accepted the office of master-general of the ordnance in Lord John Russell's ministry. In the same year he was raised to the dignity of field-marshal. He d. on the 29th April, 1854.

ANGLESEY, or **ANGLESEA** (Sax. *Angles' Ey*, i.e., "the Englishmen's island"), an island and co. of Wales, on the n.w. coast of that principality, being separated from the mainland by the Menai strait. Its form is that of an irregular triangle, the base facing the mainland. Its length is about 20 m.; breadth, about 17; coast-line, about 80; area, 275 square miles. Pop. '91, 50,098. The climate is mild, but foggy, especially in autumn; the soil generally a stiff loam, varying with sandy and peaty earth; the general aspect of the island flat and uninteresting, there being very little wood. The prevailing rock is mica schist; limestone ranges traverse the country; granite, marble, coal, serpentine, soapstone, are also found. The island is rich in minerals; the Parys and Mona copper-mines, near Amlwch, were opened in 1768, and until 1800 they were the most productive in the kingdom. Lead ore, containing much silver, has also been found. The manufactures of A. are inconsiderable. Agriculture, though still rather backward, has yet in recent years made considerable advance in the way of adopting means of improvement. Increased attention has also been given to the breeding of cattle and sheep. The cattle are of the white-faced, hornless variety, and are the largest bred in North Wales. Communication by the mainland is by the Menai suspension bridge, and the great Britannia tubular bridge, over which the Chester and Holyhead railway passes. The Anglesea Central railroad runs from Amlwch to Caerwen. See **TUBULAR BRIDGES**. A. was known to the Romans under the name of *Mona*. It was one of the chief seats of the Druidical power, which in 61 A.D. was all but destroyed by the Roman general, Suetonius Paulinus. The island was again subdued by Agricola, 76 A.D. Egbert conquered it in the 9th c.; but the native princes afterwards recovered their dominion, establishing the seat of government at Aberffraw. It was finally subdued by Edward I. The ancient remains consist chiefly of dolmens, two of which, side by side, are in the park of Plas Newydd, the seat of the marquis of A. At Holyhead are the remains of a Roman camp.

The climate of A. is milder than that of the mainland of Wales; but in the autumn the air is frequently filled with noxious mists. The co. is divided into three districts, called *cantref*s, each subdivided into two *commots*. The market-towns are Amlwch (a flourishing little seaport of 4500 inhabitants), Beaumaris (q. v.), Holyhead (q. v.), Llangefni, and Llanerch-y-medd. The first four of these towns formerly united in returning a member to the imperial parliament; the co. returns one member.

ANGLIA, East, a kingdom founded by the Angles about the middle of the 6th century, in the eastern part of central England, comprising the modern counties of Norfolk and Suffolk, and equivalent in extent to the modern see of Norwich. At first to some extent dependent on Kent, and afterwards on Mercia, on the fall of the latter, it was attached to Wessex, still continuing under its own kings until formed into a Danish kingdom under Guthrum (878). Edward, the son and successor of Alfred, forced the Danes to acknowledge him (921); and under him Wessex grew to be England. Henceforward East Anglia formed part of the kingdom.

ANGLICAN, belonging to the Church of England or to the other churches in communion with it, Scotland, Ireland and the United States. The term is sometimes applied to the High Church party. See **ANGLO-CATHOLIC CHURCH**; **ENGLAND**, **CHURCH OF**.

ANGLING. Angling differs from fishing in that it is practised, not as a means of obtaining a livelihood, but as a source of recreation and refining pleasure. It implies a certain degree of æsthetic culture, coupled with moral and religious susceptibility, and is thus pre-eminently the scholarly gentleman's pastime, the brain-worker's diversion. The meditative, humane, unselfish nature of the angler is proverbial—his sympathetic disposition, his regard for the rights of others, his moderation in the pursuit of his sport. Angling may therefore be appropriately defined as a "school of virtues," in which, while the tendency to introspection and self-examination is decided, men learn also lessons of wisdom, resignation, forbearance, and love—love for the lower forms of animal life, love for their fellow-creatures, and love for the God of nature.

The art of angling is one of the most ancient employments. Cave men of the palæolithic age were susceptible to its fascinations, as is evidenced by the discovery among troglodyte refuse of the tracings of the outlines of fishes. Prehistoric man had artistic feeling, which he expressed in faithful representations of the mammoth he hunted and the fishes he angled for; and from the fact that many sketches of the latter are found engraved on his ornaments may be inferred, not only his partiality for fish-food, but his delight in successfully matching his superior intellect against the instincts of the denizens of sea, lake, and river. This quaternary savage went farther, and provided stimuli of pleasing memory images in the shape of rude representations of actual fishing scenes and exploits. Examination of the remains of lacustrine settlements in Swiss lakes has revealed the angling implements of the neolithic age—among them fish-

hooks of clever workmanship, made of bone, deer-horn, and boars' tusks, whose size is suggestive of the huge proportions of the salmon, pike, and carp caught at that early day. The lake-dwellers were clever line-fishermen, as well as experts with the net, employed perforated stone sinkers, and floated their bait with oval or rectangular pieces of bark. With the bronze age came lighter and more symmetrical fish-hooks, which in due time were displaced by hooks of iron. Gold fish-hooks were a refinement of the aborigines of Colombia; while the ancient people of Peru made their hooks of copper. Remote North American tribes, it is believed from the appearance of certain artificial excavations, maintained fish-preserves, a practice common also among the Romans and the ancient Egyptians. The latter people obtained their sport not only in such artificial ponds, but fished also with net, spear, and bronze hook in the swamps of the Delta, and according to Isaiah "cast angle into the brooks." From Egyptian paintings that have survived, we learn that angling was considered an amusement worthy of the leisure of men of rank; and certain Mexican pictographs make it evident that Aztec youth received systematic instruction in this art. So accurately is the spawning of fish described in the Bundahish, a Pahlavi work relating to the creation, as to suggest the existence of angler naturalists among the followers of Zoroaster. Hebrew writers, too, refer not unfrequently to angling. The art was commonly practised in the time of Christ; and not without reason is it believed that their simple calling acted as an appropriate preparation for the life of purity, patience, and self-denial that was demanded of his disciples. (Read W. C. Prime's *I Go a-Fishing*, Harper & Bros.) Both Greeks and Romans pursued angling for diversion's sake. Many allusions in classical authors justify the inference that the idea expressed by our word sportsman had defined shape in antiquity. From Homer to Oppian there were piscatory poets, who dwelt on the exciting delights of the craft. Oppian's *Halieutica*, a poem of the second century A.D., treats of the natural history of fishes, and of the fishing methods of the ancients. The perfect angler is herein defined as "a well-made, active man, patient, vigilant, enterprising, courageous, and full of expedients;" and his outfit is summed up in a couplet—

"The slender woven net, the osier creel,
The tapering reed, the line, and barbed steel."

The earliest mention of fly-fishing occurs in the Epigrams of Martial, wherein is sung the rising of the wrasse "decoyed by fraudulent flies;" but Ælian, the author of a second-century zoology, gives a consummate description of this method of taking a certain species of trout as practised by the Macedonians. From the angling pictures of Ausonius in the fourth century, there is a break in the literature relating to this subject, until we reach the interesting work of Dame Juliana Berners, prioress of Sopwell Nunnery—*A Treatyse of Fysshynge wyth an Angle*, printed in England in 1496. This treatise, probably a compilation from monkish manuscripts that are lost, presents detailed instructions for the manufacture of tackle, gives faultless directions for fly-fishing, and describes minutely "xij flyes wyth whyche ye shall angle to ye trought & grayllyng." The flies have been tied by a modern expert, in accordance with the directions given in the treatise, and they do credit to the taste of the first English authoress. Her work proved a source of inspiration to a horde of succeeding writers, who scrupled not to adopt her sentiments and borrow her instructions verbatim. Leonard Mascall's *A Booke of Fishing with Hooke & Line* (1590), the next work of importance in English, is largely a reproduction of the essay of the literary prioress. "The Secrets of Angling," a delightful poem by John Dennys, appeared in 1613, and in 1651, Thomas Barker's *The Art of Angling*, the first work in which the reel is recognized as essential to success in the capture of large fish with rod and line. Barker appears also to be the discoverer of the value of salmon roe for bait. Two years later, Walton's *The Compleat Angler; or, the Contemplative Man's Recreation*, was given to the world, a well-known classic which has reached its one hundredth edition. It was of this book that Charles Lamb wrote: "It would sweeten a man's temper at any time to read it; it would Christianize every discordant, angry passion." From the date of its first publication to the present, about one thousand volumes have been written on subjects connected with fishing, so that the literature of angling is one of the richest departments of English letters.

Angling, as practically pursued at the present day, may be considered under three heads, viz.: fly-casting, bait-fishing, and trolling.

Fly-casting, the most scientific of all kinds of angling, implies the use of natural insects or artificial flies. A light, elastic three-jointed rod is required, from nine to ten feet in length, the best for the purpose being the high grade hexagonal split-bamboo rod, varying in weight, according to the use for which it is designed, from 3½ ounces up. Such a rod may be operated for hours without fatigue. A line of water-proof braided silk should be selected, of size F or G (the heavier being more easily cast); a six-foot tapered casting-line, or *leader*, made of single strands of clear, round silkworm gut, to which two, or at most three, flies are attached; and a steel-pivoted, single-action click reel, always placed at the extreme end of the butt and underneath the rod. The beginner should equip himself with the lightest and finest tackle consistent with the required strength, avoiding cheap wares as worse than useless. All gut casts and strands must be softened by thorough steeping in water; if manipulated when dry, the

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gut cracks and is rendered worthless. It is well to stain the leader some neutral tint, to render it less perceptible, an excellent color being secured by soaking for several hours in a strong infusion of green tea. Leaders may be kept in proper condition for use between pieces of damp felt. Lines are always to be dried after using, and flies carefully protected from moths.

It is impossible within the limits of a brief article to give full instructions in regard to fly-fishing and other angling; the general remarks that follow are therefore supplemented by reference to standard monographs on the several subjects in which the reader may be interested.

Casting the fly involves a backward and a forward motion of the rod, and the success of the learner depends entirely on his ability to acquire these two motions. The hand-piece of the rod is grasped firmly by the fingers of the casting hand, the thumb is extended along the rod, and the line from the reel (below and behind the hand) is allowed to pass between the rod and the forefinger, so that it can be controlled by pressure. The secret of success lies in allowing time enough for the line in the back cast to straighten out before a forward impulse is given to the rod. The motion required is largely a wrist motion, and must be deliberate and not jerky. It is here that the tyro fails; but a few lessons from an accomplished coach will afford any intelligent person an insight into this most essential principle of fly-fishing. After practice, the angler automatically allows in the back cast for varying lengths of line. The flies must fall gently on the water, without splashing, in advance of the leader, and must be kept moving for an interval, in simulation of the struggles of a natural insect, or be allowed to float down with the current. The angler should strike quickly at the rise, gauging the force with which he strikes by the size of the rising fish. Care must be taken not to draw the flies so far towards the caster that the power to strike is lost. When a fish is hooked, the object is to "play" it until it is exhausted; the angler responds to its rushes by giving it line from the reel, recovering the line as opportunity offers. When "killed," the fish is reeled close enough to be landed with a hand net. The most intelligible and practical directions for acquiring the art of fly-casting will be found in Henry P. Wells's admirable work entitled *Fly-rods and Fly-tackle* (Harper & Bros.).

As to choice of flies, no two anglers will agree, each having his favorites, and each being prejudiced by his experience in certain waters. There are a thousand varieties to select from, the leading forms of which, for American waters, are illustrated in color in Orvis & Cheney's *Fishing with a Fly* (Nims & Co., Troy). In general, small sombre flies are appropriate in sunny weather and smooth water; larger and more brilliant flies during cloudy weather, and for evening or rough water fishing. But wherever much angled for, fish become educated and wary, and the flies must be refined accordingly, while the manner of offering them must be deft and cautious. The very hat and clothing of the angler should be of some inconspicuous color, dead grass or dull olive, as such shades enable him to conceal himself more effectually from the trout—an important requisite. Some secure better results by fishing up stream, because trout naturally lie with their heads directed toward the current, on the watch for food that may float down, and hence are not likely to notice the angler's approach from behind. Those who desire to tie their own flies will find ample instructions in Keene's *Fly-Fishing and Fly-Making for Trout, Bass, and Salmon* (Forest & Stream Publishing Co., N. Y.), and in Ronald's *Fly-fishers' Entomology* (Longmans, London).

In fly-casting for black bass, the rod should not be under eight ounces in weight; and in minnow-casting, a favorite mode of angling for this popular game fish, a shorter and stiffer rod is employed. Reels are now perfected to deliver the bait at the desired distance without over-running or back-lashing. The authority on black bass fishing is Dr. Henshall's *Book of the Black Bass* (Clarke & Co., Cincinnati).

Salmon fishing necessitates the use of a longer and heavier two-handed rod, greater length of line, stronger leader, and larger and gaudier flies. The most practical work on the subject is Henry P. Wells's *The American Salmon Fisherman* (Harper & Bros.).—The fly has also been used successfully in the capture of shad, white perch, and other species.

In bait-fishing a stiffer rod is required, and hooks are attached to the leader instead of flies. When it is desirable to sink the bait, split shot or other lead sinkers are fastened to the leader or line, at least a foot from the nearest baited hook. A cork or quill float is frequently of service. The baits commonly employed are worms, grasshoppers, and minnows, for trout; minnows, the helgramite or dobson (larva of the *Carydalis*), craw-fish, the small speckled frog, grasshoppers, crickets, etc., for bass. Light tackle, mist-color leaders, and small hooks insure success. Sea fish are taken principally by bottom fishing; but much heavier tackle is used and an entirely different category of baits, including shrimp, sand-worms, shedder crabs, soft-shell clams, etc. The largest fish angled for is the giant tarpon of Florida waters; a specimen weighing over two hundred pounds has been brought to gaff with rod and line. For full information regarding the history and method of capture of this fish, see Pinckney's *The Tarpon, or Silver King* (Anglers' Publishing Co., N. Y.).

Trolling is usually practised with the spoon-bait, live or artificial minnow, or gang of flies. A swivel at each end of the leader is always necessary to prevent twisting of the line from the spinning of the bait; and leads may be attached when it is necessary

to sink the lure below the surface. A No. 1 or No. 2 Skinner's fluted spoon at the extremity of a nine-foot leader instead of the tail fly, or stretcher, and one or two flies as droppers, will be found a killing gang. Troll slowly with a ten or twelve-ounce fly-rod and multiplying click-reel, and with fifty to a hundred feet of line according to the state of the weather or water. When a fish is struck, it is to be kept under the spring of the rod, and "played" in the manner already described. Large fish are taken into the boat with a gaff, small ones with a net. Trolling for muskallonge in the Great Lakes and the waters of the Northwest is among the most exciting sports. As this fish attains a weight of 40 lbs., strong and heavy tackle is indispensable. Blue-fish and Spanish mackerel are trolled for off the coast.

To such as wish to follow the sport of angling with brain as well as with muscle, to understand the natural history of the objects of their pursuit as well as to master the various methods of capture, the following instructive monographs are recommended in addition to the volumes referred to in this article: Günther's *An Introduction to the Study of Fishes*; Day's *British and Irish Salmonida*; Goode's *American Fishes*; Seth Green's *Home Fishing and Home Waters*; Green & Roosevelt's *Fish Hatching and Fish Catching*; Wright's *Fishes, their Loves, Passions, and Intellects*; Cholmondeley-Pennell's *Modern Improvements in Fishing Tackle, The Angler Naturalist*, and the two volumes of the Badminton Library of Sports, entitled *Fishing*; Rau's *Prehistoric Fishing*; and Manley's *Literature of Sea and River Fishing*.

ANGLO-CATHOLIC CHURCH, or **ANGLICAN CHURCH**, a term frequently employed to designate collectively those churches which embrace the principles of the English reformation. The following are, in brief, the views generally entertained of those principles by the members of the churches in question: By referring the Anglo-Catholic church to the English reformation, it is not meant that her origin dates from that event, but that her tenets, as she now exists, are those which the reformation cleared of what she holds to be corruptions. For, as the word "church" itself suggests—being derived, like "kirk" in Scotland, from the Greek adjective *kuriakē*, which means "*the Lord's*" (i.e., *house*)—the origin of the Anglican church is to be traced not to a Roman but to an eastern source. She claims the name of Catholic—which also is from the Greek *katholikē*, universal—because she is united, in origin, in doctrine, and in form of government, with the universal church as it has existed, with various differences of rites and ceremonies, in all countries and in all ages. Eusebius even asserts that some of the apostles passed over into Britain. Tertullian, who lived in the 2d c., speaks of places in Britain which, though inaccessible to the Romans, were subject to Christ: "*Britannorum inaccessibleia Romanis loca, Christo vero subdita.*" At the Council of Arles, 314 A.D., there were three British bishops present; and St. Alban suffered martyrdom, under Diocletian, about the close of the 3d c., or nearly three centuries before the landing of St. Augustine (q.v.) and his missionaries, 596 A.D. Christianity, however, was driven by the heathen Saxons into the mountainous districts of Wales; and though Augustine, on his arrival, found no less than seven bishops and one archbishop in those parts, and though Bertha, queen of Ethelbert, was a Christian, yet the whole Saxon part of the country was in a state of heathenism. The British church differed from the Roman and other western churches, as to the form of administering baptism, and the time of keeping the festival of Easter (see **EASTER**), following the customs of the Greek or eastern church; and it was not until the close of the 7th c., under Theodore, that the two churches became united. In the meantime, the conversion of Britain was as much due to the labors of St. Aidan, the Scottish bishop of Lindisfern, in the north, and of St. Chad, the Saxon saint, as to the missionaries of the Roman church in the south. See **ANGLO-SAXONS**.

Nor is this glance at the history of the Anglican church, in the earlier period of her existence, unimportant, when we come to consider what and whence are her present form and tenets. From the beginning of the 8th to the middle of the 16th c., she became gradually, and at last completely, assimilated in doctrine and practice to the church of Rome, as well as subject to her domination; and the fact of her having at length freed herself from both, is in no small degree due to her having existed, in Saxon times, in a state of freedom and purity. It required, as we have seen, a struggle of nearly a century to make the British church conform to the Roman in the matters of baptism and Easter; and it was the same spirit which offered a strenuous, and for some time an effectual, resistance to the peculiar doctrines of the church of Rome and the claims of papal domination. There were always found individuals, some of great eminence, to protest against the former, whilst large sections of the church never ceased to protest against the latter. For a hundred and fifty years previous to the reformation, the doctrines of Wycliffe were leavening the body of the Anglican church. The overthrow of the papal supremacy was indeed effected by Henry VIII.; but that monarch rather hindered than favored the reformation of *doctrine*, as appeared from the rapid progress which it made when Edward VI. came to the throne. The bloody reign of Mary interposed a check to further progress; and it was not till the accession of queen Elizabeth that the principles of the reformation finally triumphed, and the Anglo-Catholic church assumed the form in which she has since continued to exist. During the period of more than 800 years preceding the reformation, she became gradually, and at length completely, merged in the Roman Catholic; at the reformation, she may be said to have emerged; when Rome, at the

Council of Trent, anathematized all who would not receive her articles, the separation became final, and the positions of the two churches with respect to each other irreconcilably hostile.

The doctrines of the A. C. are found in the *Book of Common Prayer* (see COMMON PRAYER-BOOK), based upon the second prayer-book of Edward VI., and was settled in its present form 1662 A.D. Her tenets are more *legally* defined in the thirty-nine articles, which were settled 1562 A.D. (see ARTICLES, THIRTY-NINE). As distinguished from Rome, she rejects tradition as a rule of faith, though admitting it as to rites and ceremonies, and bases all her teaching upon the books of the Old and New Testaments, rejecting from them as apocryphal certain which Rome receives as canonical. She recognizes only two sacraments, baptism and the Lord's supper, whereas Rome allows five others—namely, confirmation, orders, penance, matrimony, and extreme unction; she denies the doctrines of transubstantiation and the propitiatory sacrifice of the mass; she forbids what Rome practices—the adoration of the Virgin, saints, and angels, and the reverence of relics and images; she also denies the Roman doctrines of purgatory and the spiritual supremacy of the pope. It is not, however, to be forgotten that a great part of her liturgy is derived from the missals of the Roman church. As distinguished from the Presbyterian churches—e.g., that of Scotland—she is episcopal, and holds the unbroken succession of her orders from the apostles, as one of her most esteemed privileges; whereas the Presbyterians, especially in Scotland, reject prelacy as a remnant of popery. These do not, however, differ from her materially in essential matters of faith, but chiefly as to the sacraments, form of administering them, and the grace conveyed in them; as to the observance of seasons, such as Christmas, Lent, Easter; and as to the forms of public worship, the Presbyterians using no set forms. Her differences with the Greek Catholics are less wide than with the Roman, and will be best seen by referring to the article GREEK CHURCH. From the Lutherans she differs on the doctrines of consubstantiation in the sacrament of the Lord's supper. From the Calvinists she differs radically as to the extent of the efficacy of Christ's death, they believing only in "particular," she in "universal," redemption (meaning, of course, not that all men will be actually saved, but that Christ died for all); nevertheless, some of her articles, as the 17th, are decidedly Calvinistic. The numerous sects of Wesleyans, Baptists, and Independents do not differ from her on what they themselves consider essential articles of faith, but chiefly as to the necessity of orders, the grace conveyed in the sacraments, and the forms of public worship and of church government. But since their separation from her, endless varieties of doctrine and worship have spread among them. Unfortunately, there remains no Gallo-Catholic church with which to compare her.

The Anglo-Catholic church embraces the church of England, the Protestant Episcopal church in Ireland, the Episcopal church in Scotland, all the colonial and the American Episcopal churches. All but the latter use the English *Book of Common Prayer*; in America this has been slightly altered. The American church is one of the most flourishing offshoots of the Anglican. It was planted in Virginia, 1607 A.D., but for nearly two centuries the mother church in England withheld from her offspring the necessary boon of an episcopacy of her own. It was not till the close of the 18th century that the first three American bishops were ordained (one by the Scottish bishops in 1784, and two by the archbishop of Canterbury and the bishops of Bath and Peterborough in 1787); but now this branch of Anglo-Catholicism has spread over the greater part of the United States. See ENGLAND, CHURCH OF: EPISCOPACY: ETC.

ANGLO-ISRAELITE THEORY, an opinion as to the origin of the English people held quite extensively both in Britain and America. It is maintained that the English are descended from the Israelites who were made captives by the Assyrians under Sargon (721 B.C.), and brought into Media, where they are identified with the Sacæ or Scythians who appeared as a conquering horde there about the same time. They next swarmed westward into Northern Europe, and became progenitors in particular of the Saxon invaders of England. But unfortunately for the conclusion, we have not yet been presented with any satisfactory proof either that the Anglo-Saxons are the Sacæ or the Sacæ the Israelites, and it must not be forgotten that Scythia is much more a geographical than an ethnological term. Moreover, the so-called "identifications," on examination prove to be nothing more than verbal quibblings on the English letter, depending for success upon the reader's ignorance of Hebrew exegesis. Thus, according to the prophecy, lost Israel's location must be "the isles," which have been identified with the British Isles; but unfortunately for the argument, the word rendered "island," or "isle" is applied in the Hebrew text indifferently to any district on the sea-coast separated from Palestine by water—the shores around the Mediterranean and the coasts of Greece and Asia Minor, as well as islands proper. On this and many similar arguments they base their theory, and seek to establish it by a method of interpretation of Scripture which though opposed to all ethnological and linguistic evidence, they still consider infallible.

ANGLOMA'NIA, designates, in America and other countries, a weak imitation of English manners, customs, etc., or an indiscriminate admiration of English institutions. In German literature, an A. was especially prevalent in the 18th c., when translations of English books became numerous, and were read with great admiration. The Germans

have ascribed the sentimental and affected style of some parts of their literature to the influence of the English literature of last century. But the A. was harmless in comparison with the GALLOMANIA, or imitation of French literature and customs, which prevailed in the time of Frederick II. of Prussia, and was developed in the writings of Wieland. A remarkable A. prevailed in France for some time before the commencement of the revolution. It arose out of political considerations and admiration of English free institutions, but extended to trifles even of fashions and manners, and often became very ridiculous. Gallomania was prevalent in the United States during the last few years of the Third Empire, from 1864-1870. The Empress Eugénie set the fashions for American women, and everything French was admired and imitated by the "smart" set in New York and other American cities. It was at this time that the famous saying originated which declares that "when good Americans die, they go to Paris." Since the garish and somewhat vulgar court of the third Napoleon has been replaced in France by the more sober régime of the Republic, Anglomania has replaced Gallomania with our fashionable set. English dress, amusements, phrases, and even accent are copied with more or less fidelity, and often to the point of absurdity. Fox-hunting is attempted, coaching is fashionable, English tailors and milliners have opened branch establishments in New York, and the devotion of certain people to the cult of British manners, has for some time been a fruitful theme of popular satire. Of the many skits that have appeared upon this subject, the reader is referred to the novel, *Expatriation* which appeared in 1890.

ANGLO-SAXON LANGUAGE AND LITERATURE. The term Anglo-Saxon is of quite modern origin, the ruling race in England before the Norman conquest not knowing itself by any other name than *Ænglisc* or English. Mr. Freeman, prof. Stubbs, and other able scholars of the present day, argue stoutly for a return to the old and true name; and to all appearance the abolition of "Anglo-Saxon" and the restoration of "English" is only a question of time. English is one of the Low German family of Teutonic languages. We do not know it in its earliest form. Some centuries elapsed after the invasions of the 5th c., before any literature was produced or recorded. During this time, the dialectic differences of the various Low German tribes who had come into the island were probably diminishing, while separation from their kinsmen on the continent must on the other hand have tended to develop new peculiarities. The result is that the very oldest English is by no means the same as the very oldest dialects of Low German in the coast regions between the Rhine and the Baltic. But it most nearly resembles the old Saxon of Rhenish Prussia and Westphalia, and the old Dutch and the old Frisian of the provinces of Holland, and to the last of these it has the closest affinity. It is not to be supposed, however, that at any time before 1066, Englishmen spoke or even wrote a single dialect. There is evidence of at least two being used—a northern and a southern—an Anglian by the people of Northumbria, and a Saxon by the people of Wessex. The former is the more primitive, and as Mr. Kington-Oliphant points out (*Sources of Standard English*, 1873, pp. 35-40), has more in common with old Norse and Frisian than its southern sister; e.g., the infinitive ends not in the *an* of Wessex English, but in *a*. The history of England during the 600 years before the Norman conquest accounts both for the antiquity of the Northumbrian literature and for the subsequent triumph of the Wessex dialect. In the 7th and 8th centuries, Northumbria was the strongest, the most civilized, and the most learned of the English states. Christianity had poured its benign influences over it in double measure. Paulinus and Aidan, Rome and Iona, had both striven successfully against paganism, and light flowed over the land. Cadmon and Bede and Alcuin were all Northumbrians. That so little of this Northumbrian literature has come down to us is owing to the destruction of the northern monasteries by the Danes. The influence of Alfred, "king of the west-Saxons," and the unification of government in the island under his successors, gave the dialect of Wessex an irresistible supremacy; so much so, that even most of the early northern literature only survives in a southern dress—e.g., we can only read Cadmon in a Wessex version of the 10th century. Yet so strong was the impression left on its neighbor by the Anglian state, that not even the havoc made by the Danes of its literary monuments and its political prosperity could prevent its name from being given to the island, the people, and the tongue.

Wessex English, then—that is, the English of the court, of books, and probably in great measure of the schools—prevailed in England for more than 150 years before the Norman conquest, and is substantially what we mean when we speak of the "Anglo-Saxon" language. There is no reason to suppose that it ever superseded the dialect of the north for ordinary purposes of intercourse. Anglian lived on in the mouths of the people, and in later times has won an immortal fame in literature under the name of lowland Scotch. Cadmon and Burns both used it, though in the unapproachable verse of the Ayrshire bard it has become utterly inorganic, and so remains. English, then, before the conquest, differs from modern English in being an inflected language. Its inflections are not so rich, or various, or euphonic as those of Latin, or Greek, or Meso-Gothic, that oldest and noblest of the Low German dialects; but they are still sufficient to give it a distinct character, and to make it strange and almost unintelligible at first sight to one whose reading does not go back beyond Shakespeare. Its nouns can be grouped into declensions, and classified according to gender, and faint traces of the

terminations are preserved in the English of the present day. The *en* in "children" and "oxen" is the old *an* of the plural in nouns of the first declension; the *s* and *es*, the old *as* marking the plural of masculines of the third. Adjectives have both a definite and indefinite form. The article is as complete as in Greek, though everything has now vanished but a fragment of the neuter *that* (modern *the*). Some mutilated remains of the pronominal inflections still survive to puzzle school-boys, and delight the lovers of "hoar antiquity." Verbs are divided into "strong" and "weak" conjugations, as is still the case in German. The distinction between the indicative and subjective moods, though slight, is real; and we have not only an infinitive in *an*, but a gerund in *enne*, while the present participle in *ende* is not confused with the verbal noun in *ung*, as is unhappily the case with us who have made *ing* do duty for both. Of late years the study of the English tongue, particularly in its earliest stage, has become almost popular, and grammatical works are now numerous. Besides the fragmentary or discursive contributions to the subject of English grammar by Guest, Madden, Garnet, Grimm, Earle, Morris, Kington-Oliphant, we may specify Rask's *Angelsächsisk Sproglaere* (Stockh., 1817, with Thorpe's translation of 1865); Marsh's *Lectures on the English Language* (1861); Koch's *Historische Grammatik der Englische Sprache* (1863-69); Mätzner's *Englische Grammatik* (1865); Latham's *English Language* (1855); March's *Comparative Grammar of the Anglo-Saxon Language* (1870); and Sweet's *Anglo-Saxon Reader* (1877).

Having thus indicated very briefly some of the salient features of English as it was spoken and written before the conquest, we proceed to make a rapid survey of the contemporary literature. From what has been said above, one will naturally look to the north for the earliest examples. The *Runes* graven upon the Ruthwell cross, which was set up about 680 A.D., are now proved from the inscription itself to be the composition of Cadmon, and are the very oldest relic of Anglian poetry. Here we find Cadmon speaking his own speech, not, as in his other poems, speaking to us through a Wessex version. Other and later monuments of Northumbrian English are a *Psalter* (800 A.D.); the *Rushworth Gospels* (900 A.D.); the *Lindisfarne Gospels* (970 A.D.). But the great body of this early literature, whether produced in Northumbria, or Mercia, or Wessex, has come down to us only in the dialect of the last of these states; therefore, in referring to it, we shall consider, not the antiquity of the ms., but of the author. A good deal of it is poetical. The verse is alliterative, as in the Norse and oldest German poetry; and only in some of the later poems do we find a beginning of rhyme. The epic or narrative poems are remarkable for superabundance of often-recurring epithets, bold metaphors, and a certain pomp and magnificence of style. Of the genuine heroic poetry, however, there are few remains, the principal one being the poem of *Beowulf* (q.v.), a work which must have been composed before the Angles and Saxons quitted their original seats on the continent. Other pieces produced in Germany, though only surviving in an English form, are the *Traveler's Song* and the *Battle of Finsburgh*. The introduction of Christianity gave a religious character to Anglo-Saxon poetry; and many narrative poems are extant on religious subjects, some of which may be seen in the *Codex Oxoniensis*, a collection edited by Thorpe (London, 1842). The *Song of Cadmon* (see CÆDMON), which is preserved in Alfred's translation of Bede, has been edited both by Junius and Thorpe; and a metrical paraphrase of parts of the Holy Scriptures, ascribed to the same author, has found editors both in Thorpe (London, 1832) and Bouterwek (vol. i., Elberfeld, 1847). Cadmon is said by Bede to have d. about 680, so that both of the works in question must belong to the 7th century. Two poems from the *Codex* which Dr. Blum discovered at Vercelli in 1832, have been edited by Jacob Grimm (Cassel, 1840), under the title of *Andreas und Elene*; a poetical calendar of the saints by Fox (London, 1830); and a version of the Psalms by Thorpe (London, 1835). Among the most important prose works must be mentioned the laws, civil and ecclesiastical, from the time of Ethelbert of Kent to that of Canute, of which the best edition is in Thorpe's *Ancient Laws and Institutes of England* (London, 1840). Of historical works may be mentioned Alfred's translations of Orosius and Bede; and the *Chronicle* carried on by different hands to 1154, of which the best edition, down at least to the conquest, is Price's, in the *Monumenta Historica Britannica*, 1848, an earlier one being that of Ingram (London, 1823). It is in the province of theology that English literature before the conquest is most rich, abounding particularly in legends and homilies. A collection of homilies made by bishop Ælfric has been published by the Elfric society (2 vols., London, 1847), a society instituted in 1843 for the promotion of the knowledge of the England and English language of those times. Ælfric did much to enrich it with translations, and began a translation of the Bible. He translated the first seven books, the book of Job, and the apocryphal gospel of Nicodemus, and also a fragment of a poem on the history of Judith, of great celebrity (Oxford, 1698). The *Durham Book*, or St. Cuthbert's book, a very famous manuscript, now in the British museum, contains an interlinear gloss of the gospels in the East Anglian dialect, the text being probably of the 8th, and the gloss of the 10th century. Alfred translated the work of Boethius, *De Consolatione Philosophiæ*. The opinions of Englishmen before the conquest on astronomy, natural philosophy, and medicine are exhibited from their works by Wright in his *Treatises on Sciences written during the Middle Ages* (London, 1841), and Turner's *History of the Anglo-Saxons* (3 vols., 7th ed., 1852). Compare also Thorpe's *Analecta Anglo-Saxonica*; Marsh's *Origin and History of*

the English Language and the Early Literature it embodies (1862); and Grein's *Bibliothek der Angelsächsischen Poesie* (1857-61), and his *Bibl. d. Angels. Prosa* (1864). See ENGLISH LANGUAGE.

ANGLO-SAXONS, the collective name generally given by historians to the various Teutonic or German tribes which settled in England, chiefly in the 5th c., and founded the kingdoms of the Heptarchy. They consisted for the most part of Angles, Saxons, and Jutes. The generally received opinion is, that the first of these invaders made their appearance in Britain in 449, having Hengest and Horsa as their leaders. But under the more searching scrutiny of later writers, these famous leaders have evaporated into mythical heroes of romance, common to most of the Germanic nations; and though the fact of a great Germanic invasion in the middle of the 5th c. is not doubted, it is believed that this was by no means the earliest period at which Germanic settlements were effected in England. Long previous to this period, a portion of the coast, extending from Portsmouth to Wells in Norfolk, was known as the *Littus Saxonicum*; but whether in reference to Saxons by whom it was settled, or to roving adventurers of that race by whom it was ravaged, is still a subject of dispute. Of the three tribes mentioned above, the Jutes are believed to have been the first comers. Their original settlements were in what is now the duchy of Slesvig; and the portions of England of which they possessed themselves were Kent, the Isle of Wight, and the opposite coast of Hampshire. The Saxons, who were the next invaders, settled chiefly in the southern and central parts of England—in Sussex, Essex, Middlesex, the south of Hertford, Surrey, the part of Hampshire not possessed by the Jutes, Berks, Wilts, Dorset, Somerset, Devon, and the portion of Cornwall which did not remain in the possession of its former Celtic inhabitants. The Saxons who invaded England probably belonged chiefly to the portion of that great nation, or confederacy of nations, whose territories lay on the shores of the Baltic—occupying what are now the duchy of Holstein, the north of Hanover, and the west of Mecklenburg. The third tribe arrived at a somewhat later period. Whether, as some recent historians claim, they were Enger-Saxons, from the lower Weser, or, as most historians assert, Angles, from the duchy of Slesvig, a corner of which is still called Angeln, it is certain that they made, from 527 to 547, a succession of descents on the coasts of Suffolk and Norfolk, and latterly, on the country to the north of the Humber, and the southern part of Scotland between the Tweed and the Forth. Eventually, the Angles obtained possession of the whole of England, except the portions already mentioned; that is to say, of all the part to the north of the Avon, on the one side, and the Thames on the other—Essex, Middlesex, and part of Hertford excepted. The union of different bands of these conquerors amongst themselves, with their countrymen who had preceded them, and with the Celtic population which, though conquered, there is no reason to suppose was exterminated, gave rise to the so-called Heptarchy (q.v.)—the kingdoms of Northumbria (originally Bernicia and Deira), Kent, Sussex, Wessex, Essex, East Anglia, and Mercia.

The various independent states into which England had till then been divided, were united by Egbert, king of Wessex, in 827, into the one kingdom of England (the land of the Angles). The royal family of Wessex, which was thus raised to what, for the first time, probably, is entitled to be called the kingly dignity, never again lost its supremacy, except, indeed, during the Danish period (1017 to 1042) till the Norman conquest; and to it Alfred the Great (q.v.) belonged.

The English constitution, the origin of which is sometimes ascribed to Alfred (849-901), was not framed by him, though he restored it and improved it after the deliverance of the country from the Danes. It was essentially the same as that of other Germanic nations. At the head of the government was the *cuning* or *cyng*. The kingly office, among the Germanic nations in early times, had reference solely to the tribes or peoples governed, and never to the land which they occupied. During this period, it was naturally elective; but after the idea of great territorial possessions came to be inseparable from it, it became hereditary, though a form of election, or color of ascertaining the national will, was still retained. The life of the king, like that of every other man, was assessed at a fixed price (*weregild*, q.v.), which was that of an *atheling*, or person of royal blood, with a sum superadded as the price of his royalty. The first of these sums went to his family, the second to the people. The king possessed the power of calling together the Witenagemôt (q.v.), and of laying before them propositions for the public weal; but he had not the power of dismissing the assembly, so that in England, from the first, the real center of power seems to have been in parliament. Neither was the convocation of the Witenagemôt at the option of the sovereign, for there is every reason to believe that his power was all along limited by the necessity of consulting the principal members both of the clergy and laity of the kingdom; nor, it would seem, could he impose taxes, or declare peace or war, without their consent. The sons and other near relations of the king constituted an aristocracy of birth, called *ethelings* or *æthelings* (the same word with the German *Adel*, noble). Out of the great officers of the state, or immediate servants of the king, was gradually formed a hereditary aristocracy, closely corresponding to that which subsequently existed in feudal times. Of these, the person next in rank to the king was the *ealdorman* ("elderman," Lat. "senator") or *heretoga* ("army-leader"). "But inasmuch as the dual functions, in the Anglo-Saxon polity, were by no means confined to service in the field, the peculiar title of

heretoga is very rarely met with, being for the most part replaced by ealdorman or aldorman, which denotes civil as well as military pre-eminence" (Kemble, *ut sup.* ii. 126). Though the word is derived from an adjective signifying age, in practice, no such meaning attached to it, more than to senior, which is the original form of the word seigneur. It was to the same class of officials that subsequently the Danish title of *eorl* or earl came to be applied. The powers of these officers probably varied in the different kingdoms, whilst they remained separated; but we shall form, on the whole, a pretty accurate conception of the position of the ealdorman, if we regard him as the governor of the *gû* or shire, the *scirgerefa* or sheriff being his deputy. Much difference of opinion exists as to the rank and position, social and political, of the thane; and all that can be said with confidence is, that before the conquest, it was not convertible with ealdorman, or equivalent to baron, as it came to be after the conquest. The office seems to have implied subordinate landed tenure, similar to that by which the lands of the vassal were held of the lord in feudal times; and thus, whilst the king's thanes were frequently ealdormen, these, in their turn, had thanes of a lower rank, who appear to have been very numerous. This view is strengthened by the derivation of the term from *thegman* or *thenian*, to serve, which is the same word as the modern German *dienern*, and from the fact of its being frequently translated *minister* in the Latin charters of pre-Norman times. The whole class of ordinary freemen or commoners were called *eorls*, afterwards *churls* (a word preserved in the German *Kerl*, and in the lowland Scotch *carle*), and were generally associated under the protection of some person of rank and influence, who was called the *hlaford* (our "lord," but *lit.*, "bread-winner," or rather "bread-beginner"). This, however, was in itself no recognized title, and up to a very late period the Anglo-Saxon laws knew no other distinction than that of *eorl* and *eorl*. The Britons, who retained some degree of freedom, constituted a lower class called *wealhas* or "Welsh" (*lit.*, "foreigners," as they seemed to the conquerors). The number of slaves (*theowas*) was not very great, nor does the character of the servitude imposed on them seem, comparatively speaking, to have been oppressive. Different rights and privileges belonged to the different ranks of the Saxon people, and, as we have already said, a different *weregild* (q.v.), or pecuniary estimation, was fixed for each rank, as the penalty for homicide. The great districts or shires were subdivided into tithings (*teothunga*), each containing ten free heads of families, who were held mutually responsible for each other. Ten tithings formed a *hundred*, which had a court subordinate to the court of the shire. In important matters, the ealdorman of the shire could not decide without the concurrence of an assembly (*scirgemôt*, assembly of the shire) or thanes of the shire and representatives of townships, which met half-yearly, and corresponded to the *Witenagemôt* (assembly of the wise), or *micelgemôt* (assembly of the great) for the whole kingdom.

Christianity was introduced among the new-comers in the end of the 6th, or beginning of the 7th c. by St. Augustine, a missionary sent by pope Gregory I., called the great. Augustine became the first archbishop of Canterbury; and before the close of the 7th c., the whole of *Engla-land* was a Christian country under one metropolitan. Ethelbert, king of Kent, was the first sovereign who embraced the Christian doctrine. Bringing with them the traditions and feelings of the empire, the whole influence of the clergy was thrown into the scale of monarchy, and greatly tended to its consolidation. A Christian church, however, already existed in Scotland and the n. of England; and the influence of the Culdees (q.v.) long prevailed against the efforts of the southern prelates to establish uniformity of worship and complete conformity to Rome. But in truth, the English clergy in general were not very submissive to the authority of the popes, who did not succeed in reducing the land to complete subjection till after a long struggle. St. Dunstan (q.v.) gained for them their final victory in the 10th century. During the time of its comparative independence, the English church was distinguished for the learning and laboriousness of its clergy. Beda (q.v.) is the most eminent author whom it produced. Between his time and that of Alfred, a very great degeneracy had taken place both in the learning and efficiency of the clergy, which that active and enlightened sovereign labored to restore, but only with partial success. St. Boniface (q.v.) and many other English and Scottish missionaries labored with success in the propagation of Christianity in Germany.—Besides the works already referred to see Freeman's *History of the Norman Conquest*, and Old-English History, and Green's *Short History of the English People* (1875); also his *Making of England* (1882).

ANGOLA, a name often applied to the whole of the w. African coast from cape Lopez de Gonsalvo in lat. 0° 44' s., to San Felipe de Benguela in 12° 14' s.; but, in a more restricted sense, the name of a kingdom in lower Guinea dependent upon Portugal, and extending from the river Coanza on the south, in lat. 9° 20' s., to the Danda on the north, in 8° 20' s. The natives generally call it Donga. The interior is very imperfectly known, and the boundaries uncertain; but A. is supposed to contain about 250,000 inhabitants. The country being well watered, is covered with a most luxuriant vegetation. The heat being moderated by the sea-breeze, the orange and other fruits of the warmer temperate climates are produced, as well as those which are strictly tropical. There is a great abundance and variety of wild animals, and the mouths of the rivers swarm with sharks and crocodiles. The principal rivers are the Coanza and Danda. Much of the country is mountainous. The mountains are covered with forests, and are

rich in metals, particularly copper, iron, and silver, which, with wax and ivory, are the principal legitimate exports, although the great trade, almost to the present day, has been in slaves. Fetichism is the prevailing superstition, and circumcision is general among the natives. A. might easily be rendered very productive both of sugar and cotton, but the manner in which it has been governed by the Portuguese has not tended to develop its resources. They discovered it in 1486, and have had settlements in it since 1488; but the number of resident Portuguese is very small, and they are almost entirely confined to a few spots—forts and commercial establishments called *feiras* or *fairs*. The capital is Loanda, or Saint Paul de Loanda (q.v.).

ANGON, a barbed spear used by many early nations. The Franks, in the 7th c., employed angons both for thrusting and hurling. The staves were armed with iron, so as to leave but little of the wood uncovered; the head had two barbs. When hurled or thrust at an opponent, the head of the A. became fixed in the flesh by means of the barbs. This form of spear was much adopted by the Anglo-Saxon and other Teutonic nations.

ANGO'RA, the Ancyra of the ancients, capital of the Turkish vilayet of the same name, in the mountainous interior of Asia Minor, and distant from Constantinople about 220 m. e.s.e. It is said to have been built by Midas, the son of the Phrygian Gordius; was a flourishing city under the Persians; became the capital of the Gallic Tectosages, who settled in Asia Minor about 277 b.c.; was a principal seat of eastern trade under the Romans; and was made the capital of the Roman province of Galatia Prima. It was the seat of one of the early churches of Galatia, and the scene of two Christian councils held respectively in 314 and 358. A decisive battle between the Turks and Tartars was fought near A. in 1402, in which Timur defeated and took prisoner the sultan Bajazet I. A temple of white marble was erected by the citizens of Ancyra to the emperor Augustus, who had greatly beautified the city, and his deeds were recorded in inscriptions upon a number of tablets and the columns of an altar. These inscriptions, the *Monumentum Ancyranum*, discovered by Busberg in 1553, are important for the elucidation of ancient history. They were first printed in Schott's edition of *Aurelius Victor* (Antw. 1579), and have recently been edited with notes by Franz and Zumpt (Berl. 1845). The present A. is said to contain not more than 30,000 inhabitants, of whom one third are Armenians. It is famous for its breed of goats, with beautiful silky hair, 8 in. long. Of this goat hair, a kind of yarn is made, known as *Turkish yarn* or *camel yarn*, and of which also a manufacture of *camlets* is extensively carried on in A. itself. The A. goat is bred for its hair at the Cape of Good Hope, in Victoria, and has also been successfully introduced into the United States. Of the skin of the A. goat, the fine oriental Morocco leather is made. Many of the animals in this region are characterized by the length and softness of their hair, especially the dogs, rabbits, cats, etc. This peculiarity seems to depend upon the climate, and soon disappears in Europe.

ANGORNOW', or NGOR'NU, a t. of Bornu, central Africa, on the s.w. bank of lake Tchad, 15 m. s.e. from Kukawa. The surrounding country is very level and monotonous, but fertile. The waters of lake Tchad are usually some miles distant from the town, yet the whole intervening plain is sometimes covered with water, and the town itself is liable to destructive inundations. It is a place of considerable commercial importance; the principal articles of trade are slaves, cotton, amber, coral, and metals. The pop. is supposed to be about 30,000.

ANGOSTURA, or CIUDAD BOLIVAR, a seaport t. of Venezuela, in lat. 8° 8' n., and long. 63° 55' w., on the right bank of the Orinoco, about 240 m. from its mouth. It is built at a point or pass (*angostura*), where, on both sides, the river is narrowed by rocks to a width of 3134 ft., after having measured 3 m. across at thrice the distance from the sea. The site of A. is only 191 ft. above the sea-level—an elevation which, on the intermediate distance as above, yields an average of less than 10 in. to the mile. In fact the bottom of the river in front of the town is lower than the surface of the sea, for, even in the lowest state of the water, it is said to be 200 ft. deep, with a margin for floods to the amount of 50 or 60 ft. more. Under these circumstances, the bed of the stream must be about 250 ft. under the level of the city, or about 60 ft. under the level of the sea. When the river does rise to its highest, there are at least portions of the city inundated; and instances are believed to have occurred in which careless people were devoured by alligators in the very streets. Chiefly, as is supposed, through the free access of the trade-winds over the flat surface of the country, A. enjoys, in proportion to its latitude, a singularly temperate climate. Even in the hottest season of the year, the thermometer is said seldom to show more than 86° F.; while, between the beginning of Nov. and the end of Apr., it ranges from 77° by day to 69° by night.

The situation of A. is highly favorable, in a commercial view. The basin of the Orinoco, which lies nearly all above the town, and is estimated to contain 250,000 sq.m., or more than twice the area of the British isles, is particularly rich towards the north. On that side it reaches very nearly to the coast-line, so as to comprise some of the best parts of Venezuela. Towards the south, again, it consists, in a great measure, of boundless plains, traversed by countless herds of cattle. Over the whole of this vast basin, and that almost equally in both directions, the main stream and its affluents are, with hardly any interruptions, navigable to near the foot of the mountains. Owing to the impetuosity of the currents and the obstruction of shoals, sailing-vessels are said to take fifteen

days to sail up to A.; but with steam-navigation these impediments would in great measure disappear.

With such advantages of position, A. was a flourishing mart before the commencement of the war of independence; but the civil broils materially interfered with its prosperity. As far back as 1807, A. had 8500 inhabitants; ere twenty years elapsed, the population had been reduced to little more than a third part of the number, - but has since increased to 11,686.

ANGOSTURA BARK, or **ANGUSTURA BARK**, the aromatic bitter bark of certain trees of the natural order *rubiaceæ* and tribe *cuspariæ*, natives of the tropical parts of South America. It derives its name from the town of Angostura, where it is a considerable article of commerce. It was first brought to England in 1788. It is used in medicine as a remedy for weakness of digestion, diarrhoea, dysentery, and fevers. It is tonic and stimulant. The most important of the trees producing it is the *galipea officinalis*, which grows upon the mountains of Colombia and near the Orinoco. It is a tree of 12 to 20 ft. high, and 3 to 5 ft. in diameter, having a gray bark, trifoliate leaves, with oblong leaflets about 10 in. long, which, when fresh, have the odor of tobacco, and flowers about an inch long, in racemes, white, hairy, and fragrant. The bark contains a chemical substance not yet sufficiently examined, called *angosturin*, *cusparin*, or *galipein*, to which its medicinal efficacy is ascribed. It is supposed that a variety of A. B. is produced by *galipea cusparia* (called by some *bonplandia trifoliata*), a majestic tree of 60 to 80 ft. in height, with fragrant trifoliate leaves more than 2 ft. long. A. B. is believed to be one of the most valuable of febrifuges; but its use is at present very limited, and has, indeed, in some countries of Europe, been prohibited, in consequence of its frequent adulteration with the poisonous bark of the *strychnos nux vomica*, or the substitution of that bark for it. This poisonous bark is sometimes called *false A. B.* It differs from the true A. B. in having no smell, in its much greater weight and compactness, in its inner surface being incapable of separation into small laminae, and in the effects which are produced upon it by acids and other tests, particularly in its outer crust being rendered dark-green or blackish by nitric acid, whilst that of the true A. B. is rendered slightly orange-red. See LIQUEUR.

ANGOT, or **ANGO**, JEAN, d. 1551; a French merchant, in African and East India trade. When some of his ships had been taken by the Portuguese he provided and fitted out an armed fleet that kept Lisbon blockaded until he had received indemnity for his losses. Immensely rich at one time, he lost in speculations and in money lent to the king of France, and his last years were passed in destitution.

ANGOULÊME, the capital of the department of Charente in France, and formerly of the province of Angoumois. It is situated on the Charente, and has narrow and crooked streets, a number of paper-mills, manufactures of woolen stuffs, linen, and earthenware, etc., and a pop. (1896) of 38,068. It possesses a royal college, a museum of natural history, and several other useful institutions. In the center of the town stands the remnant of the ancient castle of A., in which was born the celebrated Marguerite of Navarre, the authoress of the *Heptameron*, and other works. The railway from Paris to Bordeaux passes through it. Much saffron and wine are produced in the neighborhood. The province of Angoumois was in early times a county; but the heir of it, in the beginning of the 14th c., being an adherent of the English, Philip the fair took possession of it, and it became an appanage of younger branches of the royal family. It was made a duchy by Francis I., and was sometimes bestowed upon natural sons of the French kings. Charles de Valois, Duke of A., a natural son of Charles IX. was a distinguished general in the reigns of Henry IV. and Louis XIII.

ANGOULÊME, CHARLES DE VALOIS, DUC D', 1573-1650; son of Charles IX. of France, and Marie Touchet; reared by his uncle Henry III. One of his half-sisters, the marchioness of Vermeuil, became the mistress of Henry IV. Charles was well educated, and at the age of 16 was grand prior of France in the order of knights of Malta. In 1591 he married a daughter of Marshal d'Amville, afterwards duke of Montmorenci. In 1589, Henry III. was assassinated, but on his death he commended Charles to his successor, Henry IV., by whom he was made colonel of horse; but the relationship of his sister to the king so displeased him that he joined with the duke of Savoy, Biron, and Bouillon, one of their main purposes being to force the king to repudiate his wife and marry the marchioness. Biron and Charles were arrested, and the former was executed, but the latter was released after a short imprisonment, owing to the influence of his relative, aided by his aunt the duchess d'Angoulême, and his father-in-law, the marquis d'Entragues. In 1604, he and his father-in-law were condemned to death and his mother to perpetual imprisonment in a convent; the woman obtained pardon and had the other sentences commuted to perpetual imprisonment. A. was in the Bastille 11 years, but in 1616 he was released and restored to his rank of colonel-general of horse. He was afterwards engaged in an important embassy to Germany. In 1627, he commanded the large force assembled for the siege of La Rochelle; in 1635, he was general of the French army in Lorraine, and in 1636 lieutenant-general of the armies. He was the author of *Memoirs from the Assassination of Henry III. to the Battle of Arques*, and other works.

ANGOULÊME, LOUIS ANTOINE DE BOURBON, DUC D', the eldest son of Charles X. of France, and Dauphin during his father's reign, was b. at Versailles on the 6th Aug., 1775. He retired from France along with his father at the commencement of the Revolution, and spent some time in military studies at Turin. In Aug., 1792, he entered Germany at the head of a body of French emigrants, but the ill success of the campaign and his own unfitness for military command led to his seeking tranquillity along with his father at Edinburgh. Till 1814, he continued an exile from France, wandering from one place to another on the continent, and latterly resident with the other members of his family in England. On the entrance of the allies into France, he appeared at the British headquarters at St. Jean de Luz, and thence issued a proclamation to the French army. He entered Bordeaux under protection of the British on 12th Mar., and made liberal promises in the name of his uncle, Louis XVIII., among which was that of complete religious liberty. He was again in the south when Napoleon returned from Elba. He was appointed lieutenant-general of the kingdom, and hastened with such forces as he could collect to oppose the emperor; but although he obtained some advantages at first, he was soon deserted by his troops, was for some days detained a prisoner, and at last sent away in a Swedish merchant-vessel to Barcelona. After the second restoration, he was sent by Louis XVIII. to the southern provinces to repress the political and religious movements there, and in 1823 he led the French army into Spain to put an end to the constitution. A man of phlegmatic disposition and mean abilities, he was, in all political matters, a tool of the ultra-royalists and the priests. When the revolution took place in July, 1830, he signed, along with his father, an abdication in favor of his nephew, the Duc de Bordeaux; and, when the Chambers declared the family of Charles X. to have forfeited the throne, he accompanied him into exile to Holyrood, to Prague, and to Görz, where he died, 3d June, 1844.

ANGOULÊME, MARIE-THERESE-CHARLOTTE, DUCHESSE D', the daughter of Louis XVI., was b. at Versailles on 19th Dec., 1778, and early displayed much quickness of intelligence and energy of character, with the most tender sympathy in the distresses of others. Having passed through the horrors of the revolution, and endured a long imprisonment, she was exchanged, on 25th Dec., 1795, for some French prisoners in the hands of the Austrians, and lived at Vienna till her marriage, in 1799, with her cousin, the Duc d'Angoulême, whose subsequent fortunes she shared. She survived him seven years, and d. Oct. 19, 1851.

ANGRA, the capital of the Azores, a seaport at the head of a deep bay on the s. coast of the island of Terceira, lat. 38° 38' n., long. 27° 12' w. It is a station for ships between Portugal and Brazil and the East Indies; but the harbor is very much exposed. It is the seat of the Portuguese governor-general of the Azores and of the bishop; is well built, but dirty; strongly fortified, and protected by a citadel at the foot of the Monte de Brazil; contains a military college and arsenal, several scientific and literary societies, a cathedral and numerous churches; and 11,067 inhabitants. There is a considerable export of wine, cheese, honey, and flax. This city furnished an asylum for the Portuguese regency from 1830 till the taking of Oporto, in 1833, by Don Pedro.

ANGRA PEQUEÑA, or PEQUENHA, a district in s.w. Africa, extending from the Orange river to latitude 26° 38' south, and inland, eighty miles from the coast. Copper is abundant, and gold, silver, and iron are found. There are eleven guano islands a mile distant from the coast. The chief settlement, Angra Pequena, at the mouth of the Little Fish river, is the best harbor on that part of the coast, except Walfish bay. The government of Cape Colony claimed this territory, but a German colony was planted at A. P. in 1883, and in 1884 England reluctantly consented to the establishment of a German protectorate over the district, excepting Walfish bay and some of the guano islands.

ANGRI, a town of South Italy, in the province of Salerno, and 17 m. n.w. from Salerno, not far from the Naples and Nocera railway. The surrounding country abounds in vineyards and cotton plantations. Pop. 11,000.

ANGSTRÖM, ANDERS JONAS, a Swedish natural philosopher, was b. 1814; entered the university of Upsala (1833), became keeper of the observatory (1843); and professor of physics (1858). From 1867 till his death in 1874 he was secretary to the Royal Society of Sciences at Upsala. He has written upon heat, magnetism, and especially optics. Among his works are *Recherche sur le Spectre solaire* (1869), *Sur les Spectres des Gas simples* (1871), and *memoire sur la Temperature de la Terre* (1871).

ANGUILLA. See EEL.

ANGUILA, or LITTLE SNAKE, one of the West India islands, so-called, perhaps, from its long and narrow figure. Next to Anegada, it is the most northerly of the Lesser Antilles, lying almost due east of the eastern extremity of Porto Rico, in lat. 18½° n., and in long. 63°-64° w. It belongs to England, having an area of 35 sq. m., and a pop. (1891) of 3699. It is low and wooded, and produces cattle, horses, salt, and phosphate of salt. Its harbor, such as it is, is beset with reefs.

ANGUIS. See BLIND-WORM.

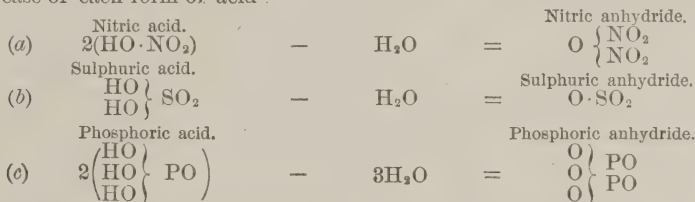
ANGUS, EARL OF. See DOUGLAS.

ANGUSSOLA, or **ANGUISCIOLA**, SOFONISBA, 1533-1620; one of the best portrait painters of the latter part of the 16th century. In 1560, at the invitation of Philip II.

she visited Madrid, where her work received great praise. Vandyck is reported to have said that he derived more knowledge of the principles of his art from her conversation than from any other source. Specimens of her work are to be seen in Madrid, and in Florence, and one portrait of herself is at Althorp. She had three sisters, all of whom were artists of repute.

ANHALT, one of the oldest principalities of Germany, and now a state of the Germanic empire, is situated on the Elbe, the Mulde, and the Saale. It consisted formerly of three duchies—A.-Dessau, A.-Bernburg, and A.-Köthen. A. contains 906 sq. m. Pop. '85, 248,166; '90, 271,759. A. is almost entirely surrounded by the Prussian territories, which intermix with it and divide it into portions. Dessau, Zerbst, Bernburg, and Köthen, are the principal towns. The country is level and fertile, producing wheat, flax, rape-seed, hops, and tobacco. Wine is produced on the Saale. Agriculture is the chief employment of the people, who are generally Protestants. Part of the former duchy of A.-Bernburg approaching the Harz mountains possesses mineral wealth in iron and other mines. A. began to be an independent principality in the first half of the 13th century. It has been repeatedly, in the course of its history, divided amongst branches of the reigning family. The division into three duchies dates from the beginning of the 17th century. It was divided originally into four parts, but the line of A.-Zerbst has become extinct. The three duchies were independent of each other; but a family compact connected the reigning lines, which often led them to take public action conjointly. Some of the princes of A. have been eminent in the political, military, and ecclesiastical history of Germany.

ANHYDRIDES, is the term now commonly given to the compounds formerly known as anhydrous acids, which was a very unsatisfactory name, seeing that these bodies do not present any of the ordinary properties of acids. In some cases, they are the result of the dehydration of acids, and in all cases they represent in their composition the acid *minus* water. One of the most eminent French chemists, Prof. Wurtz, lays down the following general principles: “(1) The anhydrides of monobasic acids (*a*) contain the elements of two molecules of a monobasic acid, *minus* 1 molecule, H_2O , of water; (2) the anhydrides of bibasic acids (*b*) contain the elements of a molecule of a bibasic acid, *minus* a molecule of water; (3) the anhydrides of tribasic acids (*c*) contain the elements of a tribasic acid, *minus* water.” Thus, using the modern formulæ and the type theory, we give a case of each form of acid:



The reader who may not at once be able to interpret these formulæ, will readily see that $\text{HO} \cdot \text{NO}_2 = \text{HNO}_3$, the new formula for nitric acid, that $\begin{array}{c} \text{HO} \left\{ \text{SO}_2 \\ \text{HO} \end{array} = \text{H}_2\text{SO}_4$, the new formula for sulphuric acid, which is now universally placed amongst the bibasic acids; and that $\begin{array}{c} \text{HO} \left\{ \text{PO} \\ \text{HO} \end{array} = \text{H}_3\text{PO}_4$, the old formula for tribasic phosphoric acid.

According to the old system, the three anhydrides would be represented by NO_5 , SO_5 , and PO_5 respectively. We might have taken organic acids, as, for example, acetic acid, succinic acid, in place of nitric and sulphuric.

The anhydrides of the monobasic acids are formed in various ways; thus, hypochlorous anhydride is formed by the action of chlorine on oxide of mercury; nitric anhydride is formed by the action of chlorine on nitrate of silver, etc. By the action of ammonia, the anhydrides of monobasic organic acids are converted into amides; thus, benzoic anhydride $\left(\begin{array}{c} \text{C}_6\text{H}_5 \cdot \text{CO} \\ \text{C}_6\text{H}_5 \cdot \text{CO} \end{array} \right) \text{O} + \text{ammonia } 2(\text{NH}_3) = \text{benzamide } 2(\text{C}_6\text{H}_5\text{CONH}_2) + \text{water } 2(\text{H}_2\text{O})$. The anhydrides of tribasic acids are often formed by the mere action of heat on the acids, as is the case with lactic and tartaric acids.

The anhydrides present no uniformity of appearance; for example, carbonic anhydride (CO_2) (commonly known as carbonic acid, which in reality is $\text{CO}_2, \text{H}_2\text{O}$) is a gas; phosphoric anhydride is a white powder; nitric anhydride occurs in crystals; sulphuric anhydride forms transparent prisms or white needles; while the anhydrides of several organic acids are oily bodies heavier than water.

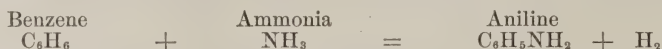
The most important property of this class is their conversion into the corresponding acids, under the influence of water.

ANHYDRITE, a mineral, consisting of anhydrous sulphate of lime, with some slight addition of sea-salt, appears in several varieties, as, 1. Granular; found in concretions with a foliated structure; 2. Fibrous; easily broken with a fracture in delicate parallel fibers; 3. Radiated; translucent; 4. Sparry, or cube spar; 5. Compact, of various

shades, white, blue, gray, red. A. is converted into gypsum by combination with a certain proportion of water, and where it is found in large masses, as on the s. of the Harz mountains near Osterode, the surface consists of gypsum. For building, A. has no great value, on account of its tendency to this change; but some of its varieties, especially the siliciferous or vulpenite, found at Vulpino, in upper Italy, are used for sculptures, and take a fine polish. When burned and reduced to powder, it is used as a manure, resembling gypsum in its effects.

ANHYDROUS is the term applied to a chemical substance free from water. Thus, ordinary lime-shell as it comes from the kiln is simply lime, CaO , without any water, and is called *anhydrous* lime; but when water is thrown upon the lime-shell, the liquid disappears by combination with the lime, which very much increases in volume and becomes *hydrated* lime, $\text{CaO} \cdot \text{H}_2\text{O}$. Again, ordinary stucco, before being used by the modeler, contains only lime and sulphuric acid, CaSO_4 , with no water, and is therefore anhydrous; but when water is added, and the stucco sets into its mould, it combines with two equivalents of water, and becomes hydrated stucco, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. Examples of A. substances are also found amongst liquids; thus, alcohol free from water is called A. alcohol; and in like manner we speak of A. acetic acid, A. nitric acid, etc.

ANILINE or **AMIDO-BENZENE** was discovered in 1826, as a product of the dry distillation of indigo; hence the name derived from *anil*, the Portuguese for indigo. This source has now ceased to be of importance, for, practically, all the A. now manufactured is obtained from coal-tar. When coal is heated in the manufacture of illuminating gas, a large number of substances are produced, and are obtained as a tarry matter of varying composition. Only a few of these bodies are of commercial importance, the chief being ammonia, carbolic acid, anthracene, naphthalene, pitch, and benzene. It is this last-named substance that yields A. If it is treated with strong nitric acid, an intermediate compound, nitro-benzene, $\text{C}_6\text{H}_5\text{NO}_2$ is formed, which, when mixed with acetic acid and iron filings, yields acetate of A. A. may also be prepared by passing a mixture of benzene and ammonia through a red-hot tube, after the following reaction:



A. may be regarded either as benzene in which one atom of hydrogen has been replaced by the group amidogen, NH_2 , or as ammonia, NH_3 , in which one atom of hydrogen has been replaced by the radical phenyl, C_6H_5 ; and according as the one or the other view is held, it is called amido-benzene, or phenylamine. The pure article called A. is a colorless, oily fluid, slightly soluble in water, but readily dissolving in alcohol and ether. It refracts light strongly, and possesses a rank aromatic taste. It boils at 360°F. (182°C.), and when pure, has a specific gravity of 1.020. It is a well-marked *Base* (q.v.), producing numerous crystalline salts, although it has no alkaline action on vegetable colors. It is a powerful narcotic poison, its fumes causing giddiness, and subsequently insensibility, while the body becomes of a livid leaden-blue color. Taken internally, it soon causes death; and even when respired in small quantity, as by the workmen engaged in its manufacture, it causes severe headaches, nausea, and vomiting.

It is, however, as being the source of the numerous A. dyes, that this body has become of leading importance. A. unites with the acids, forming salts, but these do not constitute the A. dyes. These consist of various bases obtained by the oxidation of A. by means of nitric acid, chlorine, arsenic, or other agents. In many instances, these bases are quite colorless, and only develop their tints when they are formed into salts. They may be regarded as amines—i.e., ammonia in which hydrogen has been replaced by one or more radicals. Thus we have diphenylamine, $\text{NH}(\text{C}_6\text{H}_5)_2$; dimethyl A., $\text{N}(\text{C}_6\text{H}_5)(\text{CH}_3)_2$; methyl ethyl A., $\text{N}(\text{C}_6\text{H}_5)(\text{CH}_3)(\text{C}_2\text{H}_5)$, etc. To refer at length to the various A. dyes would be impossible, as these now number some hundreds, and we can only indicate the leading varieties. The colors produced by these dyes include every shade and tint, and the list of red or violet compounds would alone exhaust our available space. *Fuchsine*, which may be taken as typical of the red dyes, is formed when A. is treated with strong nitric acid. But, in practice, many other chemicals may be substituted for the acid. *Blue dyes* are produced when aqueous A. salts are treated with chlorate of potash and hydro-chloric acid.

Mauvine, a powerful violet dye, was discovered by Perkin, in 1856, and this led the way in the manufacture of A. colors. Perkin produced it by acting on A. with bichromate of potash. We must pass over the various green, brown, yellow, and grey dyes, merely mentioning that the so-called A. blacks are usually either very intense greens or blues, appearing black through concentration.

The A. dyes are noted for their intense coloring power, one part of a rosaniline salt in a million parts of water still possessing a deep crimson color, and instantly dyeing a skein of silk moistened with vinegar. Even in so dilute a solution as one grain dissolved in 1500 galls. of water, it is capable of dyeing a silk thread immersed in it for 24 hours. Many of the dyes exhibit complementary colors (see LIGHT) when looked at by reflected and transmitted light; thus, the strong solution of salt above referred to looks a purple red by transmitted, and a brilliant green by reflected light; a fact familiar to the users of A. red ink, or an ink for any of the familiar "graph" copying processes. Here the per

assumes a green, shining appearance, quite different from the color of the ink. A. dyes are used as lacquers for cheap toys, being readily soluble in spirit varnish, the well-known "bronzing liquid" being an example of this. Mixed with gelatine or collodion, and allowed to dry in thin sheets, they furnish the thin transparencies so much used for producing stained glass imitations. They have been also used for coloring wines and sweetmeats, but as arsenic was formerly, or is still employed in the manufacture of the red varieties, this practice is not unattended with risk. The use of arsenic has of late been largely abandoned; or, when used, makers take care to eliminate the arsenic at the end of the process, so that the final product is innocuous. Numerous cases of skin-eruptions have been traced to the wearing of red flannel or red stockings dyed by A. dyes. The readiness with which any housewife can dye articles of clothing or household ornaments has made them great favorites. The chief drawback lies in the fugitive nature of many varieties, but, notwithstanding, there is a wide field still open to them. The A. colors are, as a whole, disapproved from the artistic point of view. Some of them are especially objectionable when used in the same textile fabric along with natural dyes. Notwithstanding this, the introduction of A. dyes is said to have closed half the dyers' shops in India. A few years ago, the shah of Persia prohibited the importation of these colors into that country. Germany is now the headquarters of the industry, its products being of the highest class and the lowest price. See Perkin, "On the Coal-tar Colors," in *Nature*, vol. xxxii.; and *The Chemistry of the Coal-tar Colors*, by Benedikt (Eng. trans. 1886).

ANIMA, CON, in music; with animation, in a spirited manner.

ANIMA MUNDI literally signifies "the soul of the world." The doctrine contained in this phrase was a favorite one with the early philosophers, who conceived that there resided in nature a force immaterial, yet not intelligent, which was the source of all physical and sentient life. Plato held it impossible for pure spirit—the atmosphere in which alone eternal and archetypal ideas could exist—to bear any relation whatever to matter, and he therefore supposed the latter to be operated upon by an inferior agency, the *A. M.* In the system of the Stoics, the *A. M.* was conceived to be the sole vital force in the universe; it usurped the office of pure spirit, and the doctrine became indistinguishable from pantheism (q. v.).

ANIMAL and ANIMAL KINGDOM. According to a very old classification, all bodies are divided into three kingdoms—the mineral, the vegetable, and the animal. Animals and vegetables are again classed together as *organic*, in opposition to minerals, which are *inorganic*. Mineral bodies are masses of matter without internal movement, increasing by additions from without, having, with the exception of crystals, no determinate form or size, homogeneous throughout, and without relation of one part to another. Animals and plants, on the contrary, exist as individual beings, consisting of various organs. Their existence has a beginning and an end, and at their death they are replaced by other similar beings developed out of them.

Living matter, or *protoplasm*, is clearly distinguished by its chemical composition, it being composed of very highly complex compounds, or mixture of compounds of carbon, nitrogen, hydrogen, oxygen, and sulphur, together with water and salts. During life, it is incessantly *disintegrating* and combining with the oxygen of the atmosphere, many products of change, chiefly carbonic acid, water, and nitrogenous waste, being evolved; and *reintegration* must therefore take place by intussusception, for which purpose new matter containing the necessary elements must be taken up, either from other organisms or from the inorganic world. Certain *cyclical* changes are also exhibited by all forms of living matter—that is to say, each arises as a detached portion of some previous organism; develops into a form similar to that from which it arose; tends to reproduce itself; and finally ceases to live, when its protoplasm breaks up, and its elements ultimately return in a highly oxidized state to the inorganic world.

While living bodies are thus clearly distinguishable from inorganic, every attempt to erect a similarly sharp distinction between plants and animals completely breaks down. Sensibility is not a purely animal characteristic, the well-known sensitive-plant, the sundew, and Venus fly-trap exhibiting it in the most marked degree. Cellulose, again, which forms the coating of the vegetable cell, was regarded as completely characteristic of this; but many algæ and fungi are naked at some period of their lives, while the thick external tunic of those degraded vertebrates known as ascidians has essentially the chemical composition of plant cellulose. Chlorophyl, the green coloring matter of plants, is absent from fungi and from many flowering parasites, and is yet present in infusorians, in hydra and some other invertebrates, which are thus enabled to vegetate in sunshine, forming starch and evolving oxygen. Animals thus do not necessarily feed; while the well-known insectivorous plants (see *DIONÆA*, *SUN-DEW*) capture animals and frequently digest them. Vast numbers of animals are destitute of the power of locomotion, so that, for instance, corals were unhesitatingly referred to the vegetable kingdom until about a century ago; while diatoms and many embryonic algæ and fungi, which possess marked powers of locomotion, would thus require to be ranked as animals. Locomotion is generally effected by appropriate organs, which are very different in the different classes of animals, as legs, wings, fins, suckers, cilia, etc., sometimes by muscular dilatations and contractions.

In the higher animals, it is connected with a special system of bones and muscles, which becomes less and less prominent as we descend in the scale, and at last disappears.

Nutrition is effected by swallowing and digesting organic matter by means of a mouth, stomach, and intestinal canal. A part of the food—the *chyle*, namely, which results from digestion—is taken up by a system of vessels into the body of the animal, and thrown into the blood, into which, under the action of the air in the lungs or gills, it is converted; the other part is excreted by a second orifice, except in some of the lowest forms where the mouth forms the exit. For keeping up a circulation of the blood, which must be brought to all parts of the body for the purpose of nourishment, there is provided a system of blood-vessels and, in the higher classes, a heart. See CIRCULATION. Nutrition may take place also by absorption from the external surface; but this is not considerable except, perhaps, among the lowest classes of animals. The substances that serve for the nutrition of an animal are either vegetable or animal, and the mouth and other organs are adapted accordingly. The number of omnivorous animals is small, and among these man has the greatest latitude of choice.

Propagation or reproduction takes place in a great variety of ways; among the lowest forms, by division, gemmation or budding, and cell-germs; among the more perfect, by generation between two individuals of different sex. Of the two sexes, the male is generally distinguished by superior size and strength, more brilliant coloring, larger appendages, and often stronger voice. Besides male and female, there are among some animals (bees and ants) neuters. In some of the lower kinds, the individuals are hermaphrodite. See REPRODUCTION.

All animals develop gradually, and most of them go through one or more changes of form or metamorphoses. This is most marked among insects which go through the four stages of egg, larva, pupa, and perfect insect. The class of reptiles with naked skins also go through changes, though less striking. In the higher animals, these transitions through a series of forms take place in the ovum, or before birth. In some cases the embryo comes to maturity after the exclusion of the ovum (birds and amphibia); in others (mammalia), within the body of the mother: animals of the last kind are called viviparous. The reproduction of some intestinal worms is peculiar; the egg of the mother-animal produces a sexless creature—a nurse—the eggs laid by which reproduce the original animal. A somewhat similar peculiarity is observed in some insects, as aphids. See APHIS.

The life of animals is dependent on many conditions. Among these rank warmth, atmospheric air, and moisture, along with sufficient nourishment. Light also is essential to many, though most of the colorless animals of the lower classes can dispense with it. With regard to outward pressure, the limits are wide, as is seen in the condor soaring to a height of 20,000 ft., and the whale descending to a depth of 1000 ft. below the surface of the sea. But individual animals are confined to much narrower limits; often to one circumscribed range of climate, one species of food, one medium. To go beyond those limits, though it does not always occasion death, yet gives rise to various degrees of degeneracy, from which even man with all his powers of adaptation is not exempt.

Most animals give more or less strong indications of mind: in those high in the scale, this mental life rises to intellect capable of cultivation, while in the lower classes it appears as instinct confined to a few operations. For communicating with the outer world, vertebrated animals are provided with a nervous system in connection with a central brain—a *cerebral* nervous system; the *ganglionic* nervous system of the lower animals seems to serve this purpose less and less as we descend in the scale. The impressions from without are received immediately by the organs of sense, which become more numerous and complex the higher the animal stands in the scale; among the highest, five senses are usually distinguished, which are variously developed in different species—in none so harmoniously as in man.

Nocturnal sleep, being the means of gathering strength for the activity of the waking hours, stands in intimate relation to that activity, and therefore is wanting in beings low in the scale. Winter sleep, or hibernation (q.v.), serves many animals instead of migration, to enable them to outlive the cold and hunger of winter. Analogous is the summer sleep of serpents and crocodiles, which lie buried in the dry mud during the summer droughts of the tropics.

Of the other vital manifestations of animals may be mentioned the faculty of giving *light* (glow-worm, medusæ), and that of developing *electricity*, both possessed only by a few; also *voice*, belonging almost exclusively to vertebrate animals, and of them chiefly to the warm-blooded.

A very remarkable peculiarity occurs in some of the lowest kinds of animals, in what may be termed a composite life; individuals which separately manifest many of the powers of life being united in part of their frame, many of them together into one living mass. Of this, examples are numerous among the zoophytes (q.v.), some of which have already been noticed in the article ALGONUM.

Apart from the transforming and modifying influence of man, the animals and plants of a district—its *fauna* and *flora*—give it life and character. To man himself, animals stand in a variety of relations of the highest importance. Some are directly useful to him for labor, food, the chase, etc.; others hurtful, as destroyers of vegeta-

tion, as beasts of prey, as vermin, or by their poisons.—The number of known species of animals amounts at present to about 130,000. To describe and classify these on scientific principles, is the object of zoology (q.v.).

ANIMAL CHEMISTRY. The object of researches into the chemical nature of animal substances is twofold: First, to classify the proximate or immediate component ingredients of the animal body, study their properties, their mutual relations and metamorphoses, and the ultimate elements of which they are composed; second, to investigate the processes that go on during the elaboration and assimilation of new materials, and the wearing out and excretion of old—processes that, taken together, constitute nutrition, or the vegetative side of animal life. Without a pretty complete knowledge of the first part, no successful researches can be made in the second; and it is chiefly owing to the great progress that has been made within the last thirty years in the knowledge of the chemical properties of the animal compounds containing nitrogen that we owe the recent advance in our knowledge of the chemical processes of life. That advance is not the less decided that we are still far from a complete understanding of them. The general laws of chemistry are now traced into the province of organic nature much further than formerly, and the abrupt partition between the two is removed. It is still acknowledged that these laws operate differently within the sphere of organic life, from what they do without; but instead of resting contented with saying, that owing to the vital force this could not be otherwise, the aim is now to trace the why and wherefore of this modified action as far as possible.

In the animal body two classes of substances may be distinguished: those that properly compose the body, and those that are on the way either into it or out of it. The former, or actual components of the body, are, again, of two kinds: 1. Substances that compose the actual tissues of the organs, and in which the vital functions seem properly to inhere; the substances, namely, of muscle, of nerve, of brain, of membranes, sinews, and the organic part of the bones. All these agree in consisting chiefly of carbon, hydrogen, nitrogen, and oxygen, with usually minute proportions of sulphur and phosphorus. But in respect of their mode of composition, they fall into two classes—those that yield gelatine on boiling, and those that do not. To the former belong the substance of the cartilages, bones, sinews, and skin; to the latter the fibrin of the muscles and of the blood corpuscles, the albumen of the nerves and blood, the casein of milk, etc. These last are the so-called compounds of proteine (q.v.). In the living tissues all these matters are combined with about 90 per cent of water. 2. Besides the above, which are the real animalized or vital substances, the animal body contains substances which are merely deposited in the cells and interstices of the former for imparting color, solidity, elasticity, etc. Of this kind are fat, the earthy matter of the bones, pigment, etc. Whether the minute quantities of common salt and of phosphates that are found in all parts of animals essentially belong to the constitution of the substance they are associated with, is not yet made out, but it is extremely probable they do; at all events they play a very important part.

The substances that are on their way into and out of the body form on the one hand the contents of the digestive organs, and on the other those of the organs of excretion. The vascular system forms the means of communication between both and the substance of the body, and the blood is the carrier of all that enters that substance or leaves it. In the digestive organs, accordingly, we find, along with the unaltered materials of the food, the various products of their digestion, and at last the useless refuse, not absorbable by the vascular system, and the various fluids—some acid, some alkaline—added to the food to effect its digestion, such as the saliva, gastric juice, and bile.

The matters prepared in the digestive organs for being taken up into the blood, either enter the venous system directly, or get there by first going through the lymphatic system. This last contains a fluid which is chemically very like the blood, but colorless—the chyle, namely. This fluid and the blood contain the so-called proteine compounds derived from the food, partly in solution, and partly solid in the blood corpuscles. Arterial blood contains, besides, all those salts and other substances that must be supplied for the nourishment of the various organs. The venous system, again, which brings back the blood from the different parts to the central organs, is laden with all the matters that are no longer of use, and must therefore be carried to the chief excretory organs—the skin, liver, and kidneys. The dark color of venous blood indicates that its components have undergone a change. But all blood that is on its way both to and from the parts of the body, before it can impart nourishment, must pass through the lungs, an organ in which it is brought into extensive contact with atmospheric air, and undergoes a process of oxidation, producing the following palpable results: The disappearance of a portion of the inhaled oxygen, and the substitution of water and carbonic acid in its place; the transformation of the dark venous blood and of the chyle into red arterial blood; lastly, the development of heat. Breathing, then, contributes to nutrition by making the blood fit for that purpose; it is an excretory process, inasmuch as it burns out useless matters and separates them in the form of gases; and at the same time it produces heat, without which life could not go on.

Sweat, urine, bile, and emanations from the skin and lungs, contain only products of the decomposition of effete animal substances; many of these products are highly interest-

ing in a chemical point of view, especially urea, uric acid, and bile. It is clear, then, that comparative investigation of the blood in its different states, of the excretions and secretions, can alone give any knowledge of the condition of the vegetative side of the organism; and, accordingly, this kind of investigation has in recent times become of the highest importance for pathology and diagnosis. See Liebig's famous work on *A. C.*, translated by Gregory, and the excellent *Lehrbuch der Physiologischen Chemie* (3d ed., Leip. 1854), by Lehmann.

ANIMAL FLOWER. See ACTINIA, and ANEMONE (SEA).

ANIMAL HEAT is that generated in animal bodies by certain of the changes constantly taking place within them. A certain amount of heat is necessary to the proper performance of the functions of the body, and any material increase or decrease of it from the healthy standard endangers life. The air and other objects surrounding the body being in almost all cases colder than it, are constantly stealing part of its warmth; but within the system there are processes incessantly going on which produce more heat. When the heat thus generated is not dissipated fast enough, so that the body tends to become warmer than the due degree, the accumulation finds vent in perspiration, the evaporation of which carries off the excess. The power of producing heat is in relation to the climate in which the animal is accustomed to live. It is weaker in warm climates than in cold, and consequently, when an animal is removed from a warm to a cold climate, it frequently pines and dies. In most fish and reptiles, commonly termed "*cold-blooded animals*," the temperature differs but little from that of the water or air in which they live; the same is the case with hibernating animals during the latter part of their torpid condition.

Man has the power, to a greater degree than other warm-blooded animals, of adapting himself to changes of surrounding temperature. His average standard of heat is about 98.4° F., varying with circumstances, being slightly higher after exercise or a hearty meal, and at noonday than at midnight. It also varies in diseased conditions of the body, rising to 106° in a fever, and falling as low as 77° in cholera. But if the body be in a healthy condition, the standard of heat is maintained, even when the person is exposed to intense heat, as in the case of men attending furnaces; one can for a short time be exposed to 350° of heat without materially raising the temperature of his own body, although he will lose weight by the copious perspiration necessary for the evaporation.

Throughout the animal kingdom the power of generating heat bears a close relation to the activity or sluggishness of the animal. Thus, many birds, which are perpetually in action, have the highest temperature (100°–112°); and the swallow and quick-flighted birds, higher than the fowls which keep to the ground. The higher the standard of A. H. the less able is the animal to bear a reduction of its temperature; if that of a bird or mammal be reduced 30°, the vital changes become slower, more languid, and death ensues. Fish and frogs, on the other hand, may be inclosed in ice and yet survive.

The sources of animal heat in the living body are the chemical and physical changes continually taking place. The chemical changes are those occurring in respiration, digestion, nutrition, secretion, and muscular and nervous action. It has been shown experimentally that when those functions are performed there is an increase of temperature. Heat is, no doubt, also produced by any movements causing friction. The ultimate sources of heat are (1) the energy locked up in the food consumed; and (2) in the oxygen inhaled in respiration. The food, in the processes of digestion, is split up into its constituent parts; these are absorbed, and may become parts of the textures and fluids of the body for a time; and these textures, in the performance of their functions, disintegrate, become redissolved, and are then eliminated by various channels from the body: all of these processes generate heat. On the other hand, the oxygen of the air, by intuing, in the process of respiration, with the carbon or hydrogen of certain of the tissues or of the food, produces carbonic acid and water, and thus also heat is generated. If we estimated the potential energy of the food consumed and of the oxygen inhaled in respiration as so much heat, and also estimated, as near accuracy as possible, the amount of heat produced in the various processes above referred to, it would be found that this latter amount of heat would be less than that derivable from the food and oxygen. This deficiency is accounted for by the work done by the body, partly as internal mechanical work, such as the movements of heart and lungs, etc., and partly as external mechanical work, such as the movements of the body in the performance of the daily activities of life. This view of A. H., which is now universally adopted, was first put forward by J. R. Mayer, of Heilbronn, in 1842–1845, and numerous applications of it have since been made to many physiological and pathological phenomena.

ANIMAL MAGNETISM or **MESMERISM** is a supposed influence or emanation by means of which one person can act upon another, producing wonderful effects upon his body, and controlling his actions and thoughts. It was fancied to have some analogy to the magnetism of the loadstone, and hence its name. The term has been used to group together a multitude of manifestations deemed of a wonderful kind, and which have given rise to an amount of delusion and credulity hardly exemplified on any other subject. Electro-biology, Odyism, table-turning, spirit-rapping, table-talking, spiritualism, have been classed as only modifications of the same phenomena. The art of inducing the magnetic state, as practiced by its discoverer, Mesmer, involved the use of

apparatus—the *baquet* or magnetic tub, iron rods, etc.; but the more common means have been *passes* made by the hands of the magnetizer from the head of the “subject” or patient downward, or simply making him fix his eyes on the operator. He then generally feels a creeping sensation stealing over the surface, and shortly falls into the mesmeric sleep—a state more or less resembling somnambulism. About one person in ten is found capable of being thus affected, to a greater or less extent. While in this state, the functions of the body are liable to be much affected; the pulsations of the heart and the respiration are quickened or retarded, and the secretions altered, and that chiefly at the will of the operator; at his direction, the limbs are made rigid, or become endowed with unnatural strength; one liquid tastes as any other, and is hot or cold, sweet or bitter, as the subject is told; in short, every thought, sensation, and movement of the subject obeys the behest of the mesmerizer. According to the mesmeric theory, the nervous energy of the operator has overpowered that of the subject, as a powerful magnet does a weak one, and the two are in *rapport*, as it is termed. In some cases the mesmeric trance assumes the form of *clairvoyance*. See SOMNAMBULISM.

It has been clearly established, however, that the notion of a force of any kind whatever proceeding in such cases from a person or from a magnetizing apparatus, is a delusion. The effects, whatever they are, must have their cause somewhere else. Where it is to be looked for was indicated, though not followed up, as early as 1785, in the report of the commissioners, one of whom was Franklin, appointed by the king of France to examine the pretensions of Mesmer. They report that “on blindfolding those who seemed to be most susceptible to the influence (of this agent), all its ordinary effects were produced when nothing was done to them but when they imagined they were magnetized, while none of its effects were produced when they were really magnetized, but imagined nothing was done; that when brought under a magnetized tree (one of Mesmer’s modes of operating), nothing happened if the subjects of the experiment thought they were at a distance from the tree, while they were immediately thrown into convulsions if they believed they were near the tree, although really at a distance from it; and that, consequently, *the effects actually produced were produced purely by the imagination.*”

But this part of the science of human nature—the reflex action of the mental upon the physical—had not then been sufficiently studied, and is not now widely enough known to render the conclusion of the reporters a satisfactory explanation of the phenomena; and the fallacies of mesmerism, though subjected since to many similar exposures (Dr. Falconer of Bath, e.g., annihilated the patent metallic tractors of Perkin, by making wooden ones exactly like them, which produced exactly the same effects), have constantly revived in some shape or other. One chief cause of the inveteracy of the delusion is, that the opponents of mesmerism do not distinguish between denying the theory of the mesmerists and the facts which that theory pretends to explain, and have been too ready to ascribe the whole to delusion and fraud. It thus happens that the most skeptical often become all of a sudden the most credulous. Finding that things do actually happen which they cannot explain, and had been accustomed to denounce as impostures, they rush to the other extreme, and embrace not only the facts but the theory, and call this, too, believing the evidence of their senses. Now, the reality of the greater part of the manifestations appealed to by the mesmerist must be admitted, though we deny his explanation of them; and even where their reality must be denied, it does not follow that the mesmerist is not sincere in believing them; there is only greater room than in any other case for suspecting that he has deceived himself.

The first to give a really scientific direction to the investigation of appearances of this class was Mr. Braid, a surgeon in Manchester (see HYPNOTISM), who detaches them altogether from the semblance of power exerted by one individual over another, or by metallic disks or magnets, and traces the whole to the brain of the subject, acted on by *suggestion*, a principle long known to psychologists, though never made so prominent as it ought to be. The subject is ably handled in a paper in the *Quarterly Review* for Sept., 1853 (said to be by Dr. Carpenter). The reviewer traces the operation of this principle through the most ordinary actions, which no one thinks wonderful, up to the most miraculous of the so-called “spiritual” manifestations.

Ideas become associated in our minds by habit or otherwise, and one being awakened brings on another, thus forming a train of thought; this is *internal suggestion*. But impressions from without originate and modify these trains, constituting *external suggestion*. While awake and in a normal condition, the *will* interferes with and directs these trains of thought, selecting some ideas to be dwelt upon, and comparing them with others and with present impressions. A comparative inactivity of this selecting and comparing faculty, leaving the flow of ideas to its spontaneous activity, produces the state of mind called *reverie* or *abstraction*. In dreaming and somnambulism, the will and judgment seem completely suspended; and under its internal suggestions the mind becomes a mere automaton, while external suggestions, if they act at all, act as upon a machine. These are well-known facts of the human constitution, and independent of mesmerism, though their bearing upon it is obvious.

Another fact of like bearing is the effect of concentrated attention on any object of thought in intensifying the impression received. This may proceed so far, in morbid states of the nervous system, that an idea or revived sensation assumes the vividness of a present impression, and overpowers the evidence of the senses. Ideas thus become

dominant, overriding the impressions of the outer world, and carrying themselves out into action independently of the will, and even without the consciousness of the individual. These dominant ideas play a greater part in human actions and beliefs than most are aware of. "Expectant attention" acts powerfully on the bodily organs, and often makes the individual see and hear what he expects to see and hear, and, without his consciousness, moves his muscles to bring it about. These, too, are recognized facts in the science of physiology and psychology (see Carpenter's *Human Physiology* and Dr. Holland's *Chapters on Mental Physiology*).

These principles enable us to bring together and explain a whole class of phenomena, reverie, dreaming, somnambulism, the inspiration of the Delphic priestess, religious ecstasies, the physical excitement attendant on "revivals" and "camp-meetings," belief in witchcraft, possession, and mania, individual and epidemic. And it is now held that the manifestations of mesmerism, electro-biology, etc., belong to the same class, and are to be accounted for in the same way.

The mesmeric state is produced by a steady gaze at some fixed object. There is no peculiar virtue in the eyes of the mesmerist or in a metallic disk, for a spot on the wall will produce the effect. The thing requisite is a monotonous and sustained concentration of the subject's will, producing weariness and vacancy of mind; and this resembles the condition that induces reverie and sleep, and leaves the mind open to any suggestion, and at the command of any idea that may be made to possess him. But that he is governed by *his own ideas*, and not by the *will* of the mesmerizer, is clear. *No wish of the mesmerizer, or of any other person, was ever known to affect the "subject" until it was conveyed to him by voice or otherwise;* while an idea suggested by putting his body in a certain posture, or by an accidental touch, has the same effect as a command. If he seems more subject to the will of the mesmerizer than of any one else, it is because he was previously impressed with that idea, and is therefore more awake to his suggestions. It is thus that the operator is enabled to play upon him as an instrument—to make him taste, feel, think, and act, and lose and recover memory, the power over his limbs, or even his own identity, as the operator dictates. We must content ourselves with thus indicating the principle of explanation, leaving to the reader to apply it in detail. See MESMERISM.

The manifestations connected with table-turning, such of them as are genuine, are explained by the operation of *expectant attention*. A number of individuals sit round a table with their hands resting upon it, having the idea in their minds that it will or may move, the *direction* of the expected movement being also agreed upon. Accordingly, if none of the performers are very skeptical, it generally does move after a time, all declaring, and in perfect good faith, that they did not press. And yet it has been proved, by a contrivance of Faraday, that there always is pressure, though without the will or consciousness of the performers; and this is only what is to be looked for from the involuntary effects of a dominant idea. This explanation does not suffice for many of the wonders related by believers to have happened. But all such are to be received with suspicion.

In spirit-rapping, a "medium" puts, somehow, the questioner into communication with any departed spirit he may wish to consult, and the answer is given by raps, supposed to be made by the spirit. The questioner runs a pencil over the letters of the alphabet, and the raps are given as the pencil comes to the successive letters forming the words of the answer. Many of the "media" in this species of "spiritual" manifestation have been proved to be impostors, though it is not necessary to suppose that they are so in all cases; they may be imposing on themselves, as witches did of old. There is no doubt, however, that the wonderful revelations they sometimes made of things known only to the questioner, arose from involuntary indications made by the latter—by his pausing, without knowing it, at the letters of the expected answer. A variation on the mode of communicating with the world of spirits, consists in putting the questions to a table, which is manipulated, as in table-turning, and gives its answers by rapping with one of its feet, or by rocking, as may be agreed upon. The agency of the *expectant ideas* of the performers in these cases is apparent in their own narratives. Would it not otherwise be strange that spirits should reveal heaven to Robert Owen as organized on his own social theory, while a Protestant clergyman finds the world of spirits pervaded by a horror of the pope (Rev. E. Gillson, *Table-talking*), and to pious Scotch Presbyterians every revelation regarding it is completely in accordance with Calvinistic theology.

Such are the views of those who, in regard to this matter, may be denominated the "rationalist" party. But there is a large class of intelligent persons who hold the explanations above given to be insufficient. After making every allowance for deception, whether intentional or unintentional, they find many undoubted facts remaining which are quite beyond the scope of suggestion, dominant ideas, or any other of the usually received theories, physical or psychological. Phenomena of the character in question are, therefore, still the subject of earnest investigation in Great Britain and America. The reports of the English society for psychical research (first vol. 1880), have dissipated much of the mystery formerly attending slate-writing and other so-called "manifestations." In answer to some of the statements in the article SPIRITUALISM, it may be said that, according to Moncure D. Conway, the medium with whom Crookes conducted his experiments was afterwards convicted of fraud. The most damaging adverse testimony is that of the noted Fox sisters themselves, given publicly in New York, Oct. 21, 1888, that their career has been a series of deceptions, and that the world-renowned "raps" were made by movements of the joint of the big toe.

ANIMALCULE, a term etymologically applicable to any very small animal, and limited in actual use to those which are microscopical. Animalcules exist in prodigious numbers, and of many different kinds, their size being such that multitudes of them find ample space for all the movements of an active life within a single drop of water; and they abound almost wherever there is moisture, at least wherever organic matter is present. The *monas crepusculus* of Ehrenberg is only 1-2000 part of a line, or 1-24,000 part of an inch in diameter. "Take any drop of water from the stagnant pools around us," says prof. Rymer Jones, "from our rivers, from our lakes, or from the vast ocean itself, and place it under the microscope; you will find therein countless living beings moving in all directions with considerable swiftness, apparently gifted with sagacity, for they readily elude each other in the active dance they keep up. . . . Increase the power of your glasses, and you will soon perceive, inhabiting the same drop, other animals, compared to which the former were elephantine in their dimensions, equally vivacious and equally gifted. Exhaust the art of the optician, strain your eyes to the utmost, until the aching sense refuses to perceive the little quivering movement that indicates the presence of life, and you will find that you have not exhausted nature in the descending scale." Animals belonging to different classes are, however, microscopical, and the term *A.* is either applied to them all with reference to their mere size, or it is restricted to those which received from Müller, with whom the scientific study and classification of them may be said to have begun, the name of *animalcula infusoria*, and which are by Cuvier made the fifth and last class, under the name *infusoria*, of his fourth great division of the animal kingdom, *radiata*. See **INFUSORIA**. The name *infusoria*, indeed, etymologically considered, is not more appropriate than *animalcula*, perhaps not quite so much so, as only a small proportion of the animals of this class are actually found in infusions, but it continues to be generally employed by zoologists. Attempts have been made to classify them according to their structure, and to assign them their proper places accordingly in the general arrangement of the animal kingdom; and one part of them have been formed into a class under the name *rotatoria* (q.v.), regarded as probably belonging to the articulated division; another part, formed into a class called *polygastrica*, consisting of the simpler kinds, have been in like manner somewhat doubtfully referred to the radiated division. Agassiz unhesitatingly describes the class *infusoria* as "an unnatural combination of the most heterogeneous beings." He regards many as locomotive *algæ*; and of those which are true animals, he expresses the opinion that many are merely the chrysalis states of other animals. There still remain, however, many kinds which are perfect animals. For type, see illus., **INVERTEBRATES**, vol. VIII.

Among the most remarkable discoveries of modern science must be reckoned that of fossil *animalcules*, in such abundance as to form the principal part of extensive strata. This discovery was made by Ehrenberg, who found the *polierschiefer* (polishing-slate or *tripoli*) of Bilin to be almost entirely composed of the silicious shields of a minute fossil *A.*, the length of one of which is about $\frac{1}{888}$ of a line, so that about 23 millions of animalcules must have gone to form a cubic line, and 41,000 millions to form a cubic inch of the rock. Ehrenberg succeeded in detecting the formation of similar strata in deposits of mud at the bottom of lakes and marshes, the mud swarming with living animalcules, probably in their turn to be fossilized. The *bergmehl* or mountain meal of Sweden and other parts of Europe, which is sometimes used as an article of food, is entirely composed of the remains of animalcules; not merely, however, of their silicious shields, for it contains a considerable percentage of dry animal matter. Some animalcules prefer waters impregnated with iron, and their death gives rise to an ochreous substance, in which iron is the principal ingredient.

ANIMALS, CRUELTY TO. England has the honor of first making this a distinct subject of public attention by the formation of societies for its prevention, and by legislative enactments making it punishable. The movement has now extended into France and Germany.

Benevolence to *A.* is a result and a proof of extending civilization. It is the carrying out to its just limits the principle of sympathy, which first appears when the savage ceases to think exclusively of himself and learns to identify his tribe with himself. It is this principle of sympathy, only carried further, that, under Christianity, unites all the tribes and races of men in one family. And it only requires cultivation of the faculty of sympathy generally, and the direction of the attention to what the lower animals have in common with man—sensitivity, namely, to pain—to make any one feel that needlessly to inflict that pain is to sin against his own nature, and therefore a crime. This ought to be a special object of attention in the training of children. Besides the cruelty to beasts of burden and domestic animals arising from cupidity, many, especially children, torture creatures from thoughtlessness and ignorance. This, therefore, is one of the many instances where instruction of the herd may be made to mend the heart. It deserves to be remarked that the mere extinction of life does not necessarily constitute cruelty. There is often more cruelty in prolonging the life of an animal than in taking it away. It is the infliction of needless pain or restraint that is the essence of cruelty to animals.

ANIMALS, CRUELTY TO (England). This is an offense against the English law, and has frequently of late formed the subject of legislation, the chief act of parliament, the

12 and 13 Vict. c. 92 (passed in 1849), being that which at present regulates the law of England on the subject. By this statute it is provided that if any person shall cruelly beat, ill-treat, overdrive, abuse, or torture any horse, mare, gelding, bull, ox, cow, heifer, steer, calf, mule, ass, sheep, lamb, hog, pig, sow, goat, dog, cat, or any other domestic animal, he shall forfeit a sum not exceeding £5 for every such offense, recoverable before a justice of the peace in a summary way; and if by any such conduct he shall injure the animal, or any person or property, a further sum not exceeding £10 to the owner or person injured. The acts also inflict penalties in the case of conveying cattle by railway without water-supply, etc., causing unnecessary pain or suffering; and also in the case of bull-baiting, cock-fighting, and the like, and makes a variety of humane provisions for the regulation of the business of slaughtering horses and other cattle not intended for butcher's meat.

Formerly, in Scotland, this offense was punishable at common law—that is, according to the Scotch legal principle—common law as distinguished from *statute* law—and so late as the year 1826, a man was convicted there of affixing a stob, or prickle armed with iron nails, to the tail of a pony, by which the animal was wounded in the hind-legs; and punished with two months' imprisonment. But the Scotch law at that time did not view such conduct so much as an act of cruelty to the animal injured, as of "malicious mischief," as it was called, and, in fact, regarded such treatment of animals as simply an offense against *property*. An act of parliament, however, passed in the year 1850, puts the law on this subject in Scotland on the same footing as it is in England. The act referred to contains provisions similar to those enacted by the 12 and 13 Vict. for England; and in both acts it is declared that the word "animal" shall be taken to mean "any horse, mare, gelding, bull, ox, cow, heifer, steer, calf, mule, ass, sheep, lamb, hog, pig, sow, goat, dog, cat, or any other domestic animal."

ANIMALS, CRUELTY TO (America). There are societies for the prevention of cruelty to animals in 33 of the 44 United States. The first society was chartered by the legislature of New York in 1866, chiefly through the efforts of Henry Bergh (q. v.), who was its president for 22 years. Its name indicates its purpose. Up to the close of 1885 it had secured prosecution in 12,046 cases, and had humanely destroyed over 19,000 working horses that were disabled past recovery. The society met with much opposition until a decision of the highest court affirmed its powers. There are societies in Canada, New Brunswick, Cuba, Brazil, and the Argentine Republic. See BERGH, HENRY.

ANIMALS, WORSHIP OF. The practice of worshipping animals, as well as certain plants and stones, prevailed among many of the nations of antiquity, and is still common among barbarous tribes. That animals should be held sacred and receive worship, need excite no surprise when we bear in mind the origin of polytheistic worship generally. They are manifestations of power; mysterious, too, because actuated by impulses differing from those of man; and often, by their greater acuteness of sense and more unerring instincts, seeming to possess supernatural knowledge. Besides this general ground, various animals have been associated with the gods as emblems and in other ways. But a more important source of the superstitious regard bestowed on animals is the belief that gods, and spirits in general, often take the form of animals, either temporarily or as a permanent abode. The doctrine of the transmigration of souls is not confined to India. Kindred notions, though not perhaps reduced to system and formally enunciated, are all but universal; they seem as indigenous in the heart of Africa as on the banks of the Ganges. It was as a manifestation of the soul of Osiris—originally, like all the other Egyptian deities, a sun-god—that the sacred bull Apis was worshipped in ancient Egypt. When the Spaniards first visited the coasts of South America, they found a ludicrous kind of animal-worship practiced by the natives on the coast of Cumana (Venezuela). "They held the toad to be, as they said, 'the lord of the waters,' and therefore they were very compassionate with it, and dreaded by any accident to kill a toad; though, as has been found the case with other idolaters, they were ready, in times of difficulty, to compel a favorable hearing from their pretended deities, for they were known to keep these toads with care under an earthen vessel, and to whip them with little switches when there was a scarcity of provisions and a want of rain. Another superstition worthy of note was that when they hunted down any game, before killing it they were wont to open its mouth and introduce some drops of maize-wine, in order that its soul, which they judged to be the same as that of men, might give notice to the rest of its species of the good entertainment which it had met with, and thus lead them to think that if they came too, they would participate in this kindly treatment."—*Helps*.

ANIME, a resin exuding from the trunk of the *hymenæa courbaril*, a large tree of the natural order *leguminosæ*, sub-order *cæsalpinææ*, a native of New Spain and Brazil. It somewhat resembles copal, but is more easily soluble in alcohol.—The name A., or gum A., is, however, also given in Britain to a resin called in India copal, the produce of *vateria indica*, a tree of the natural order *dippteracæ*; whilst the copal of Madagascar is produced by *hymenæa verrucosa*, and that of Brazil in great part by several species of *hymenæa*, a tree of which genus is also regarded as the probable source of the copal of Mexico.

ANIMISM, a term formerly applied in biology to denote the theory that the soul, *ánima*, is the vital principle, the cause of the normal phenomena of life and of the abnor-

mal phenomena of disease. It is now current in the wider anthropological sense, as including "the general doctrine of souls and other spiritual beings." The absence of any other suitable word is thought to render this application indispensable, and may be conceded to render it allowable; for "spiritualism," though occasionally used in a general sense, has become associated with a particular modern development of animistic doctrine; "anthropomorphism," though less objectionable, is inadequate; while "theology" cannot be extended to include the lower forms of the doctrine of spiritual beings, and indeed many of its higher developments, except by a departure from ordinary usage. An animistic philosophy, explaining the more strange or striking of the phenomena of nature by the hypothesis of direct spiritual agency, is universally prevalent among savage races; and there seems tenable ground for the inference that it must have been the philosophy earliest developed among prehistoric societies of mankind. It is manifestly the development of that earliest analogical reasoning which imagines external objects to be conscious and animated with life essentially like our own; it is the expression and application of the first general theory of natural causes, rude and inadequate, yet marvelously self-consistent and serviceable; and its history appears to be primarily that of a dominant and pervading philosophy, applied to explain all the phenomena of nature and life, save only those ordinary sequences which the uncivilized man regards as needing no explanation; afterwards, in the progress of culture, its history is that of a system of thought modified and restricted by the increase of positive knowledge, and surviving in either greatly refined or greatly enfeebled forms. A. is one of those terms which should be used not without cautious limitation of its range. In our ignorance of the nature of the *soul* in brutes or in men, the philosophy of the soul may easily extend itself unduly, involving on one side matter, and on the other side spirit in statements whose indeterminateness will render them unsatisfactory. A., as denoting the doctrine of the soul, has no claim to decide scientific principles pertaining to either the purely spiritual or the purely material realm. See Tylor's *Primitive Culture* (London, 1871).

ANIONS. See ANODE: ELECTRO-CHEMISTRY.

ANISE, *Pimpinella anisum*, an annual plant of the natural order *umbelliferae*. The genus *pimpinella* has compound umbels, usually without involucre. Two species are natives of Britain; they are commonly known by the name of burnet saxifrage, and have no properties of importance. A. is a native of Egypt. It is an annual plant; the stem is 1½ to 2 ft. high, dividing into several slender branches; the lower leaves roundish-heart-shaped, divided into three lobes, and deeply cut; those of the stem pinnate, with wedge-shaped leaflets. The umbels are large and loose, with yellowish-white flowers. It is much cultivated in Egypt, Syria, Malta, and Spain, and even in Germany, especially in the district around Erfurt, where a large quantity of the seed is annually produced. Attempts were made, more than 200 years ago, to cultivate it in England; but the summers are seldom warm enough to bring it to perfection. It is occasionally sown in gardens for a garnish or for seasoning. A.-seed (*aniseed*) is used as a condiment and in the preparation of liquors; also in medicine as a stimulant stomachic, to relieve flatulence, etc., particularly in infants; and it has been used in pulmonary affections. It has an aromatic, agreeable smell, and a warm, sweetish taste. It contains a volatile oil called *oil of A.*, which is nearly colorless, has the odor and taste of the seed, and is employed for similar purposes. One hundred weight of seed yields about 2 lbs. of oil, which is obtained by distillation; but at Erfurt the oil is made from the stems and leaves. A.-*water*—water flavored with the oil, and sugared—is much used in Italy as a cooling drink. See *illus.*, FLOWERS, vol. VI.

STAR ANISE, or **CHINESE ANISE**, is the fruit of *illicium anisatum*, a small tree of the natural order *magnoliaceæ*. See **ILLICUM**. It receives its name from the star-like form of the fruit, which consists of a number (6 to 12) of hard, woody, one-seeded carpels. The tree has evergreen leaves, somewhat like those of the common laurel. The whole plant is carminative, and is used by the Chinese as a stomachic and as a spice in their cookery. The qualities of the fruit so much resemble those of the common anise, that it may be used instead of it, and by distillation it yields an oil which is very generally substituted for oil of anise, and is imported into Europe in considerable quantity to be used instead of it. Star aniseed is also imported, chiefly from China and Singapore.

ANJER, or **ANJIER**, a seaport of Java, on the straits of Sunda, 60 m. w. of Batavia. It was the landing place for passengers and mails for Batavia, but was destroyed by a volcanic eruption in 1883, and the port was removed to a point 10 miles distant from the old site.

ANJOU, a former province in the n.w. of France, of about 3080 sq. m. in extent, now forming the department of Maine-et-Loire, and small parts of the departments of Indre-et-Loire, Mayenne, and Sarthe. Its capital was Angers. The ancient inhabitants of A. were the *Andegavi*, who long and resolutely resisted the Roman arms.—The male line of the counts of A., who took their name from it, having become extinct in 1060, their title and possessions passed by the female line to the powerful house of Gatinais; and from one of this family, Godfrey, count of A., sprung the Plantagenets. He conquered the greater part of Normandy; assumed the title of duke; and in 1127, married Matilda, the daughter of Henry I. of England, and widow of the emperor Henry V. Through her, his son inherited the English throne, which he ascended in 1154 as Henry II. A. now became one of the possessions of the kings of England; but in 1204, the French acquired

it by fortune of war; and it was bestowed as a fief upon Philip, the son of Louis VIII., and afterwards upon his brother Charles, who became the founder of that house of A. which gave kings to Naples, Sicily, and Hungary. Charles II. of Naples gave A. to his daughter Margaret on her marriage with Charles of Valois, the son of Philip IV. Her son ascended the throne of France as Philip VI. in 1328. King John, in 1360, made A. a duchy, and gave it to his son Louis, and he succeeding to the crown of Naples, it remained a possession of the kings of Naples till the overthrow of that dynasty, when René II., the last of his family, was deprived of it by Louis XI., who permanently annexed it to the French crown in 1484. Since that time, it has merely given an honorary title to princes of the royal family. The last who bore it was the grandson of Louis XIV., who became Philip V. of Spain.

ANKARSTRÖM, JOHN JACOB, the assassin of Gustavus III., king of Sweden, b. in 1761, the son of a lieutenant-colonel. He came very early to court, in the capacity of a page, and next entered the army; but having obtained the rank of captain, left it in 1783; married and settled in the country. He was a man of violent feelings and rough manners, and much opposed to the measures taken by the king for curtailing the power of the senate and of the nobles. Implicated in certain intrigues in the island of Gothland, he was accused of treason, but released for want of positive evidence. His hatred to the king was increased by the harsh usage he met with in the course of his trial. In 1790, he went to Stockholm, and together with Gen. Pechlin, counts Horn and Ribbing, and others, planned the assassination of the king. A. begged that the execution of the deed might be left to him; but Horn and Ribbing disputing the point, they drew lots, and the lot fell upon A. In 1792, the king convoked the diet at Gefle, and the conspirators hoped upon that occasion to carry out their purpose; but being thwarted in this, they had to wait till the 15th of Mar., when Gustavus was to attend a bal masqué, during which A. shot at and mortally wounded him. He was instantly apprehended, and at once confessed his crime, stoutly denying, however, that he had an accomplice. On the 29th of April, he was condemned to death, publicly flogged for three successive days, and then beheaded. He went to the scaffold with perfect composure, rejoicing to his last moment in the success of his crime.

ANKER, a liquid measure once much used in north Europe, now only in Denmark and Norway. It varies in capacity; at Copenhagen it contains 9.88 U. S. gallons; at Hamburg, 9.54; at Bremen, 9.57; at Lubec, 9.89; at Amsterdam, 10.22; at Berlin, old measure 12.45; new, 9.07 gallons.

ANKLAM, or **ANCLAM**, a t. of Prussia, in the province of Pomerania, 44 m. n.w. from Stettin, on the right bank of the Peene, and 4 m. from its mouth in the Kleine Haff. The river is navigable to A., which carries on a considerable commerce, and has long been a place of commercial importance, having been admitted into the Hanseatic League in 1319. It has manufactures of linens and woollens; it has also several breweries, soap-works, and tanneries, and ship-building is actively prosecuted. During the middle ages, A. suffered more than almost any other town from fire and pestilence; and in the wars of the 17th and 18th c., it was again and again besieged and sacked. On the close of the seven years' war, in 1762, its fortifications were happily dismantled. It is still, however, surrounded by an old wall with three gates. It contains many interesting specimens of the Hanseatic or north German architecture, very like the Flemish. Pop. '90, 12,784.

ANKO'BAR, the capital of the kingdom of Shoa, in Abyssinia, is built 8198 ft. above the sea-level, on the ascent of the table-land, in lat. 9° 34' n., long. 39° 35' e. The higher portion of the t. is fortified in a very primitive way, by means of a palisade constructed of stakes, with intertwined branches of trees. The royal palace, unlike the most of the buildings, which are chiefly of wood, is built of stone and mortar, although the roof is thatched. The vegetation around the place is extremely rich, and the air is both cool and pure, so that A. is a very agreeable residence, and is consequently favored with the presence of the court during a portion of the year. Pop. 7,000.

ANK'WITZ, NICOLAJ, Count, d. 1794; a Polish politician, ambassador to Copenhagen, and deputy from Cracow in the diet. In the diet which was forced to the partition of the kingdom he was deputed to sign the treaty with Russia, and immediately afterwards a large salary was conferred on him by Russia, with the appointment of president of the council. Soon after the beginning of the Kosciusko revolution he was convicted of treason, and hanged.

ANKYLO'SIS (Gr. *ankulōsis*, bending or crooking; *ankulē*, stiff-joint) is a term used in surgery to imply a stiffness in any joint. It is usually the result of disease, which, having destroyed the articular cartilages, leaves two bony surfaces opposed to each other. The reparative powers of nature cause a union to take place by means of granulations between them. This bond of union may become osseous, so as to render the joint perfectly rigid, or it may continue membranous, allowing of a certain amount of motion. Some joints, especially the elbow, are very apt to become ankylosed; and in the knee or hip-joints, this osseous A. is reckoned the most favorable termination to disease, as the limb can then afford a rigid support for the trunk. Joints, stiff through a membranous A., may be forcibly bent, and the bond of union ruptured, so as to restore mobility, or allow of their being placed in a convenient position. A. of the joints between the ribs

and the vertebræ is common in advanced age; and there are some cases on record of universal A. of all the joints. A case occurred in 1716 of a child only twenty-three months old with all its joints thus stiffened; and there are in various museums specimens of adult bodies in this condition.

ANNA (*annoe*). An East Indian coin having a value of a sixteenth of a *rupee*, or about 1½*d.* sterling, or about 3 cents of United States money. It is money of account only. In Bengal accounts are kept in *pice*, 12 to an *anna*, and 16 *annas* to the *rupee*. Under Queen Victoria, coins of the value of 2 *annas* (silver), worth 2½*d.*, as well as a ½ *anna* have been issued.

ANNA, SAINT, according to tradition, was the daughter of Mathan, priest of Bethlehem, and the wife of St. Joachim. After 21 years of barrenness, she is said to have given birth to the Virgin Mary, the mother of the Savior. Nothing positive is known regarding her life; her name does not occur in the Scriptures, nor even in the writings of the fathers during the first three centuries. The first who mentions her is St. Epiphanius, in the 4th c.; but towards the 8th, she was all but universally invoked. Her body was believed to have been transferred from Palestine to Constantinople in 710 A.D.; and her head to Chartres, by Louis de Blois, about 1210 A.D. The inhabitants of Duren (duchy of Juliers, Germany) also pretend to have a head of St. A.; and a third is believed to be in possession of the church at Ursitz, in the diocese of Würzburg, although numerous other churches claim to be equally favored. The Roman Catholic church has a festival in her honor on the 26th of July; the Greek, on the 9th of Dec. In Austria, Bavaria, and other Catholic countries, this festival is one of great importance. In honor of St. A., a fraternity, called the fraternity of St. A., was instituted in the 13th c. After the reformation, it was organized anew by the Jesuits; and in modern times has manifested some vitality in Bavaria and Catholic Switzerland.

ANNABERG, a t. of the kingdom of Saxony, in the district of Zwickau, on the right bank of the Sehm, 18 m. s. from Chemnitz. It is situated 1800 ft. above the level of the sea, in a mining district; the surrounding hills containing mines of silver, tin, cobalt, and iron. It has extensive manufactures of lace and of silk ribbons. The ribbon manufacture was introduced here by Protestant refugees from Belgium, who fled from the persecution carried on by the duke of Alva. Pop. '90, 14,960.

ANNA CARLOV'NA, 1718-46, regent of Russia during the minority of her son Ivan, was the daughter of Charles Leopold, duke of Mecklenburg, and of Catharine, sister of the Russian empress, Anna Ivanovna (q. v.) In 1739 she married Anthony Ulric, duke of Brunswick-Wolfenbüttel. Her son, Ivan, b. Aug. 20, 1740, was nominated by the empress Anna Ivanovna as her successor. This was done at the instigation of Biron (q. v.), the empress's favorite, whose object was to secure the regency for himself; and the empress, on her death-bed, actually appointed him regent, but he continued in power only for a short time. She d. on Oct. 28, 1740, and his overthrow took place on the 18th of Nov. in the same year. A. C. now proclaimed herself grand-duchess and regent of Russia; but she showed no capacity for managing the affairs of a great country, spent her time in indolent enjoyments, and resigned herself very much to the guidance of one of the ladies of her court, Julia von Mengden. A conspiracy was formed by a party desirous of raising to the throne Elizabeth, daughter of Peter the Great and of Catharine, and this was accomplished on Dec. 6, 1741. The infant Ivan was sent to the castle of Schlüsselburg, where he was afterwards murdered; Anna and her husband were condemned to imprisonment for life, and conveyed to Cholmogory, a t. upon an island in the Dwina, near the White sea. Here she bore two children, and d. in childbed in 1746. Her husband remained a prisoner for 39 years, and d. in 1780.

ANNA COMNENA, a learned Byzantine princess, author of one of the most valuable works to be found in the collection of the Byzantine historians, was the daughter of the emperor Alexius I. (Comnenus), and was b. on Dec. 1, 1083. She received the best education that Constantinople could give, and early displayed a fondness for literary pursuits; but was also habituated from her childhood to the intrigues of the court; and during the last illness of her father, she entered into a scheme, which her mother, the empress Irene, also favored, to induce him to disinherit his eldest surviving son, John, and to bestow the diadem on her. Failing in this, she framed a conspiracy against the life of her brother (1118); and when her husband, Nicephorus Bryennius, a Byzantine nobleman, either from timidity or virtuous principle, refused to join in it, she passionately lamented that she had not been born a man, and upbraided him as having the soul of a woman. Her brother spared her life, but punished her by confiscation of her property, which, however, he soon after generously restored. Disappointed and ashamed, she withdrew from the court, and sought enjoyment in literature. On the death of her husband (1137), she retired into a convent, where she d. in 1148. Her life of her father, entitled *Anna Comnena Alexiados libri 19*, is full of professions of careful inquiry and a supreme regard for truth, but "the perpetual strain of panegyric and apology awakens our jealousy." The style is characterized by an elaborate affectation of rhetoric. The best edition is that of Schopen (2 vols., 1839). See Oster's *A. Comnena* (1868-71).

ANNA IVANOV'NA, Empress of Russia, was b. on the 8th of Feb., 1693, and was the second daughter of Ivan, the elder brother of Peter the Great. She was married in 1710 to the Duke of Courland, the last of his race, who d. in the following year; and she obtained the duchy of Courland for her favorite, Biron, a Courlander of low birth. The throne of Russia was offered to her by the supreme council on the death of Peter II. in 1730, on conditions which greatly limited the power of the monarchy, but which she soon broke. Her elevation to it was very much owing to the intrigues of the chancellor Ostermann, who had had the charge of her education, but who was disappointed in finding her not grateful and tractable, as he expected. For three years, however, her rule was mild, humane, and equitable. The army was reformed, greater liberty was allowed to the landed gentry, government debts were paid up, and the poll-tax for the serfs lessened; but her paramour, Biron, having determined to govern the nation as well as the empress, a sudden and deplorable change ensued. This man, a blood-thirsty and avaricious wretch, established something like a reign of terror through the land. He is said to have banished not less than 20,000 persons to Siberia; numbers were knouted, had their tongues cut out, or were broken alive on the wheel. Eleven thousand perished in this way. Prince Basil Dolgoruki, and others of his family, suffered the ignominy of the scaffold. At length the health of the empress gave way. She d. on Oct. 28, 1740, and left the throne to her grand-nephew, Ivan, with Biron as regent. See **RUSSIA** and **BIRON**.

ANNALS. These were at first books which contained a record, in chronological order, of the principal events occurring in one or more years. The name is derived from the oldest historical documents of the Romans, the *Annales Pontificum*, or *Annales Maximi*, the duty of drawing up which devolved upon the *Pontifex Maximus*; but these were all destroyed by the Gauls at the sack of Rome, some hundreds of years before the time of Christ. After the second Punic war, A. similar to the former ones were composed, not, however, by the priests, but by educated members of the Roman laity, such as Fabius Pictor, Calpurnius Piso, etc. At a still later period, the term was applied to any historical work that followed the order of time in its narrations, separating them off into single years—as, for instance, the *Annals* of Tacitus.

ANNAM'. See **ANAM**.

ANNAMABOE', a small seaport t., protected by a strong British fort, on the gold coast of Africa, in lat. 5° 5' n., long. 1° 5' w., 10 m. e. of Cape Coast Castle. In 1807, the inhabitants took part with the Fantees against the Ashantees, in consequence of which the t. was attacked by an overwhelming force of the latter, and most of the inhabitants were slain. It is the seat of some trade and was once a great slave port. It is a good landing place for vessels. Pop. between 4000 and 5000.

ANNAN, a seaport, and royal and parliamentary burgh, in the co. of Dumfries, on the river of the same name, near its entrance into the Solway firth. It is neat and well built; among the chief industries are tanning and bacon-curing. The river, which affords excellent salmon-fishing, is spanned by a bridge of three arches, and is navigable to within half a mile of the t. for vessels of 250 tons, while considerably larger vessels can enter the mouth of the river, half a mile below. There is regular communication by steamers with Liverpool and Whitehaven; and the Glasgow and Southwestern and Caledonian railways connect the town with Edinburgh, Glasgow, and Carlisle. The burgh unites with Dumfries, etc., in returning one member to parliament. Pop. in '91, 4858.

ANNANDALE. See **DUMFRIESSHIRE**.

ANNAP'OLIS, a co. in w. Nova Scotia, on the bay of Fundy; 1700 sq. m.; pop. '91, 19,352. The surface is varied, but generally rough, and well adapted to fruit culture. Agriculture is the main business, and dairy products are exported. There are also valuable deposits of iron ore. Capital, Annapolis, formerly Port Royal.

ANNAP'OLIS, a seaport of Nova Scotia, in lat. 44° 40' n. Pop. about 3000. It stands on a river of the same name that runs into the bay of Fundy. Its harbor is excellent, though somewhat difficult of access. A. is the oldest European settlement to the n. of the gulf of Mexico, having been established in 1604 by the French as the capital of their province of Acadia, under the name of Port Royal. Acadia having been conquered by the English in 1710, and ceded by the French in 1713, Port Royal changed its name in honor of Queen Anne, continuing to be the seat of government till, in 1750, it was superseded by the newly founded city of Halifax on the outside coast of the peninsula—the new capital, with its better position and superior haven, having diverted most of the trade of the place. Since then, A. has rather decayed than otherwise; and it would have done so more decidedly, had not its river been navigable for boats during nearly the whole of its course of 70 miles.

ANNAP'OLIS. The capital of Maryland, on the s. bank of the Severn River, about 2 m. from its entrance into the Chesapeake Bay, 30 m. from Baltimore, and about 40 m. by railroad from Washington, D. C. It is the terminus of the Annapolis, Washington, and Baltimore railroad, which connects with the Washington branch of the Baltimore and Ohio railroad. It contains the governor's house, a fine state-house, churches, banking facilities, the U. S. Naval Academy (q. v.), St. John's College, founded in 1789,

a house of the Redemptionists, and a convent, some fine statues, periodicals, gas, water and electric light plants and many oyster-packing establishments. Pop. 1890, 7604.

ANN ARBOR, city and co. seat of Washtenaw co., Mich., on the Huron River, and the Michigan Central, and the Ann Arbor railways; 28 m. w. of Detroit and 246 n. e. from Chicago. It was settled in 1824 and incorporated as a city in 1851. It is the seat of the University of Michigan. (See MICHIGAN, UNIVERSITY OF.) The city has churches, banks, a high-school building, several large hotels, breweries, and manufactures agricultural implements, furniture, etc. It has street electric railways, gas and electric light works, and many fine residences. Daily, weekly and monthly periodicals are published here. A boulevard passes along the north side of the river, commanding a picturesque view of the valley and the city. Pop. 1890, 9431.

ANNARR', or **ONARR**, in Norse mythology, the husband of night, and father of Jord (the earth).

AN'NATES, or **FIRST FRUITS**, in the ecclesiastical law of England, means the value of every spiritual living for a whole year (hence the name from the Latin word *annus*, a year), which the pope, claiming the disposition of every spiritual benefice within Christendom, reserved out of every living. This impost was at first only levied from persons appointed to bishoprics; but it was afterwards extended to the inferior clergy. The value of these A. was calculated according to a rate made under the direction of pope Innocent IV. (1253 A.D.), but which was afterwards increased by pope Nicholas III. (1292 A.D.). The valuation of pope Nicholas is still preserved in the exchequer. This papal exaction was abolished by the act 25 Henry VIII. c. 20, and by an act passed in the following year of the same reign (26 Henry VIII. c. 3) the right to A. or first fruits was annexed to the crown. The various statutes subsequently passed on this subject have all been consolidated by an act (the 1 Vict. c. 20) regulating the collection of the moneys so levied. See **FIRST FRUITS**, **QUEEN ANNE'S BOUNTY**.

ANNATTO. See **ARNOTTO**.

ANNE, Queen of Great Britain and Ireland, and the last British sovereign of the house of Stuart, was b. at Twickenham, near London, on 6th Feb., 1665. She was the second daughter of James II. of England, and VII. of Scotland (who at the time of her birth was duke of York), by his first wife, Anne Hyde, the daughter of the famous Clarendon. When she was about seven years of age, her mother died; and her father soon after professed himself a member of the church of Rome; but he permitted his daughters to be educated in the principles of the church of England, to which A. always retained an ardent if not a very enlightened attachment—seldom manifesting, in the whole course of her life, so much resolution and independence of mind as in her resistance to the attempts of her father, after his accession to the throne, to induce her to join the church of Rome, accompanied, as these were, with the offer that she should be preferred in the succession to her sister Mary. To advance his own popularity, her father gave her in marriage, in 1683, to Prince George of Denmark, brother of Christian V., an indolent and good-natured man, who concerned himself little about public affairs, and was endowed with no capacity for taking part in them. A.'s own weakness of character and that of her husband gave opportunity to lady Churchill, afterwards duchess of Marlborough, her early playfellow, to acquire an influence over her which, during many years, was almost supreme and absolute. During the reign of her father, A. lived in retirement, taking no part in politics. On the landing of the prince of Orange, she seems at first to have hesitated, and even to have been inclined to adhere to the cause of her father, whose favorite daughter she was; but lord Churchill had made up his mind to an opposite course, and his wife induced the princess to adopt it. She consented to the act by which the throne was secured to the prince of Orange in the event of his surviving her sister Mary; but quarreled with her sister about questions of etiquette, and was afterwards drawn into intrigues in which the Churchills were engaged, for the restoration of her father, or to secure the succession of the throne to his son. She even entered into a secret correspondence with her father. She was herself childless when, on the death of William III., on 8th Mar., 1702, she succeeded to the throne. She bore, indeed, 17 children; but only one, the duke of Gloucester, survived infancy, and he d. in 1700, at the age of 11. The influence of Marlborough and his wife was most powerfully felt in all public affairs during the greater part of her reign. The strife of parties was extremely violent, and political complications were increased by the queen's anxiety to secure the succession for her brother. In so far as she had any political principles, they were opposed to that constitutional liberty of which her own occupancy of the throne was a sort of symbol, and favorable to absolute government and the assertion of royal prerogative according to the traditions of her family. These principles, and her family attachment, tended to alienate her from the Marlboroughs, whose policy, from the time of her accession, had become adverse to Jacobitism, and who now, along with Godolphin, were at the head of the whig party. The duchess also offended the queen by presuming too boldly and haughtily upon the power which she had so long possessed. A. found a new favorite in Mrs. Masham, a relation of the duchess, whom she herself had introduced into the royal household. To Mrs. Masham's influence the change of government in 1710 was in a great measure owing, when the whigs were cast out, and the tories came into office, Harley (afterwards earl of Oxford) and St. John (lord Bolingbroke) becoming

the leaders of the ministry. But, although concurring more or less in the queen's design to secure the succession of the throne to her brother, the new ministers had quarrels among themselves which prevented its successful prosecution, and it oozed out sufficiently to alarm the nation, and to alienate many of their political supporters. A dispute between Oxford and Mrs. Masham, carried on for hours in the queen's presence, and which terminated in her demanding his instant resignation, seems to have brought on the attack of apoplexy of which she died, 1st Aug., 1714. The elector of Hanover succeeded her as George I.—The public events of her reign belong to the history of Britain; but the union of England and Scotland, in 1707, may be mentioned in its personal relation to herself, as she was the last sovereign who reigned over these as separate kingdoms, and the first sovereign styled of Great Britain.—Queen A. was of middle size, and comely, though not beautiful. She was virtuous, conscientious, and affectionate, more worthy of esteem as a woman than of admiration as a queen. Her reign is often mentioned as a period rendered illustrious by some of the greatest names, both in literature and science, which her country has ever produced; but literature and science owed little to her active encouragement. See Burton's *Reign of Queen A.* (1880).

ANNEALING is the process of tempering resorted to in the manufacture of glass and the preparation of several of the metals, whereby these substances acquire a hardness combined with tenacity which renders them much stronger, and consequently more durable. In the making of glass vessels by the glass-blower, they are of course quickly reduced in temperature whilst the fused glass is being modeled into the desired shape. The atoms of the glass thus rapidly compelled to assume a position do not seem to be properly and firmly arranged together, and the vessel is very liable to be broken, either by a slight but smart blow, or a sudden increase or decrease in temperature. This brittleness is very observable in the *lacrymæ vitree*, or glass tears, known as *Prince Rupert's drops*, obtained by allowing molten glass to fall into water, when the glass forms pear-shaped drops, which are so brittle that if they be scratched with a file or the end be broken off, the whole bursts asunder and falls down into a fine powder of glass. The same brittleness is exhibited in *Bologna jars*, or *vials*, which are small and very thick in the glass; and yet, if a minute angular fragment of any hard substance be dropped into the jar, the latter flies to pieces.

In the A. of glass vessels, they are arranged in iron trays, and placed in a long oven, where they are gradually raised in temperature to near their fusing-point, by the trays being drawn along to the hottest part of the oven; and thereafter, the trays, with their contents, are very slowly drawn into a cooler and cooler part, till they become cold. The A. operation generally takes 12 hours for small articles such as wine-glasses; but days, and even a week or two, are required to anneal completely large vessels. Many articles of glass, such as tubes for steam-gauges, lamp-glasses, etc., are annealed by being immersed in cold water, which is very gradually raised to its boiling-point, and thereafter cooled.

The metals are often subjected to the process of A. When medals are repeatedly struck by the die-stamper, the gold or other metal, by the concussion, becomes brittle, and requires to be now and again heated and annealed. In wire-drawing, also, the metal becomes so hard and brittle that it requires A. to prevent its breaking into short lengths. Boiler-plates, which have been drawn out by rolling, require to be annealed before they are riveted together. The brazier, in hammering out copper and brass vessels, must stop now and again, and anneal the metal. Articles of tin, lead, and zinc can be annealed in boiling water. The tempering of steel is just a process of A. The steel is placed in an oil-bath, or surrounded by a metallic mixture which has a low fusing-point; and according to the temperature to which it is subjected, a steel with various degrees of softness and strength is obtained. Parke's table of metallic mixtures capable of being used in the tempering or A. of instruments made from steel, is as follows:

	ALLOY.		Fusing-point ° F
	Lead.	Tin.	
Lancets.....	7 parts	4 parts	420°
Razors	8 "	4 "	442
Penknives	8½ "	4 "	450
" large.....	10 "	4 "	470
Scissors, shears.....	14 "	4 "	490
Axes, plane irons.....	19 "	4 "	590
Table-knives.....	30 "	4 "	530
Watch-springs, swords.....	48 "	4 "	550
Large springs, augers.....	100 "	4 "	558

The theory of A. is very imperfectly understood. A certain rearrangement of the atoms of the glass or metal no doubt takes place, and an absorption of heat occurs. It is possible that as the crystalline structure is indicative of brittleness, and the fibrous texture characteristic of strength, that the passage of glass or metal from a brittle to a non-brittle material may be due to the development of a fibrous structure, where a crystalline one was originally present.

ANNE ARUNDEL, a co. in Maryland; 400 sq.m.; pop. '90, 34,094, incl. colored. It is watered by the South and Severn rivers. The surface is hilly and the soil fertile, producing wheat, corn, tobacco, etc. Co. seat, Annapolis, which is also the capital of the state.

ANNECY, a t. of the dep. of Haute Savoie, France, at the n.w. extremity of the lake of Annecy, and 21 m. s. from Geneva. The lake of Annecy is 1426 ft. above the sea, and is surrounded by magnificent mountain scenery. It is about 9 m. long and 2 m. broad. Its waters flow by the Fieran to the Rhone. In the 12th c. A. was called *Anneciacum novum*, to distinguish it from old A., *Anneciacum vetus*, which occupied the slopes of a neighboring hill, and was a place of some consequence in the times of the Romans. In the earlier part of the middle ages, A. belonged to the counts of Geneva, and on the extinction of that house, it passed to the house of Savoy, in whose possession it remained, except for a brief period under the French empire, until the transference of Savoy to France in 1860. It has manufactures of linens, cotton-yarn, paper, straw goods, iron, and steel-wares. Its linen bleachfields have subsisted since 1650. The town is clean, and has an air of respectable antiquity. The shops in many of the streets are under arcades. The most remarkable buildings are the château, once the residence of the family of Genevois-Nemours, the old bishop's palace, the cathedral, and the modern church of St. Francis, the latter of which boasts of possessing the relics of St. Francis of Sales and La Mère Chantal. Pop. '91, 11,947.

ANNELIDA, or **ANNELIDES** (from Lat. *annulus*, a ring), a small class of articulated animals, mostly included by Linnaeus in his class *vermes*. They have a more or less elongated body, which is always composed of numerous rings. The first of these rings assumes, in most of them, the characters of a head, but in some there is no proper head. They have no articulated limbs, but most of them are provided with bristles and hairs, often in numerous bundles, which are of use to them in locomotion; some, which want these, are furnished with suckers at the extremities, and employ them for this purpose; some remain fixed in one place. Their bodies are always soft, and without external or internal skeleton; but some of them form for themselves a calcareous covering by exudation, others form coverings partly by exudation and partly by agglutination. Their blood is generally red, but not from red corpuscles, as in the vertebrate animals; sometimes it is greenish or yellowish. Their nervous system is simple. Many of them have eyes, and many have tentacula. Most of them live in water, and of these the greater part inhabit the sea. Those which live in water breathe by gills, which are variously formed and placed; some which are terrestrial, as earthworms, have, instead of gills, numerous small respiratory sacs. They are all hermaphrodite; most of them, however, requiring mutual fecundation, and most of them are oviparous. They feed in general upon other animals, and some of them live by sucking blood. They are now divided into four orders: 1. *Dorsibranchiata*, having gill-tufts disposed regularly along the body, and composed of animals of comparatively active habits; 2. *Tubicolæ*, having gill-tufts near the head, and provided with shelly or other coverings; 3. *Terricolæ*, destitute of all external appendages except minute bristles, and breathing by respiratory sacs; 4. *Suctoria*, destitute even of bristles, and provided with suckers.

ANNE OF AUSTRIA, daughter of Philip II. of Spain, was b. in 1601, and in 1615 became the wife of Louis XIII. of France. The marriage was so far from being a happy one, that the royal pair lived for 23 years in a state of virtual separation—a result due chiefly to the influence of Cardinal Richelieu, whose fixed determination to humble the house of Austria, led him to spare no means for alienating the affection of Louis from his queen, by representing her as ever involved in the most dangerous conspiracies against his authority. The naturally grave and phlegmatic disposition of the queen was not calculated to counteract the hostile influence of the great minister. On the death of the king in 1643, A. became queen-regent, and evinced her discernment by choosing as her minister Cardinal Mazarin, by whose able management the young king (Louis XIV.) came, on attaining his majority, into possession of a throne firmly established on the ruins of contending parties. The character of A. had much influence in molding that of her son. She displayed the same cold and haughty temper, combined with the power to charm by a condescending grace, the same love of pomp and power, and the same skill in the choice of able instruments, thus compensating for the want of genuine personal greatness. She died in 1666. Two curious personal peculiarities of this queen are mentioned by biographers—her antipathy to roses, so strong that while passionately fond of flowers and perfumes, she could not endure even the picture of a rose; and the extraordinary delicacy of her skin, which made Mazarin remark, that “if her majesty were condemned to the infernal regions, her hell would be to sleep in brown holland.”

ANNE OF BRITTANY, Queen of France, 1476-1514; daughter and heiress of Francis II., duke of Brittany. She received that duchy as her dowry on marrying Charles VIII., Dec. 6, 1491, Brittany then becoming incorporated with France. She had been affianced to Maximilian of Austria, but Louis XI., her guardian, forbade the marriage, and thus assured the aggrandizement of his kingdom and family. After her husband's death she married his successor, Louis XII., over whom she had great influence, and she administered the kingdom with ability during his campaigns in Italy.

ANNE OF CLEVES, 1515-57; fourth wife of Henry VIII. of England, daughter of John, duke of Cleves. Henry wedded her reluctantly to make friends among the Protestant German princes, Jan. 6, 1540; but he divorced her in July of that year.

ANNEKE JANS. See **BOGARDUS, EVERARDUS.**

ANNESLEY, ARTHUR. See **ANGLESEA, Earl of.**

ANNEXATION, the acquisition of territory previously independent or in the possession of another power, may take place by treaty or otherwise with or without the consent of the inhabitants of the annexed district. There has been a marked reaction in this century toward the absorption of minor states by the larger nations, first exemplified by the United States in the annexation of Florida and Louisiana, and later of Texas and California and Alaska. Further illustrations of this tendency are afforded as far back as 1815 by the Vienna Congress, which ceded Venice to Austria, a large part of Saxony to Prussia, Genoa to Sardinia, Norway to Sweden. In each of these latter cases the cession was made without reference to the wishes of the inhabitants of the ceded territory; and in Germany, after the successful war with Austria in 1866, several states were annexed to Prussia and their autonomy extinguished against the will of a part of the population.

An instance of voluntary annexation is afforded in the incorporation of certain Italian provinces in 1859 by Piedmont. Here the annexed territory lost its former governmental structure and was merged in the other; while in the case of Prussia the states annexed retained in large measure their previous form. Mere cession of a territory does not nullify the existing laws, until otherwise ordained; and until possession is taken, the prior authorities retain their police functions, although, technically speaking, sovereignty ceases upon completion of cession.

Full sovereignty over the ceded territory does not pass until delivery, after which the relation of the inhabitants to their former sovereign is dissolved, but not their relations to each other. Titles to property are not affected by cession.

ANNIE LAURIE, Scottish song written in the 18th century, by a Mr. Douglas, of England, to Annie, daughter of Sir Robert Laurie, of the Maxwellton family. It was set to music by Lady Jane Scott.

ANNIHILATIONISM, the theory of the utter extinction of man's being, both bodily and spiritual, either at death or at some later period. Little was heard of the doctrine until in the 18th century, when Taylor, of Norwich, England, McKnight, and a few others wrote upon it. Among later supporters perhaps archbishop Whately may be counted; for in his *View of the Scripture Revelations Concerning a Future State*, he says that in the passages in which "death," "destruction," "eternal death," are spoken of, the words may be taken as signifying literal death, real destruction, the utter end of things; that "unquenchable fire" may mean a fire that quite consumes what it feeds upon, and the "worm that dieth not" may be that which entirely devours its prey. In the United States, the question was revived about 25 years ago by *Six Sermons on the Question, are the Wicked Immortal*, by George Storrs. Just before these appeared, Dr. McCulloch, in his *Analytical Investigations concerning the Scripture*, maintained that after the final decisions at the judgment the wicked will be utterly destroyed by the visitation of God in wrath. Hudson, in *Debt and Grace, as Related to the Doctrine of a Future State*, denies that the natural immortality of the soul is ever expressed or even implied in the Bible; on the contrary, life and immortality are brought to the redeemed alone; all others being not only naturally mortal, soul and body, at death, but, after that mortal suspension of positive existence, all are raised at the final resurrection and cast into the lake of fire at the second death. He denies that endless conscious suffering is ever affirmed to be the nature of future penalty, but affirms that the penalty consists in privation, and that in the perpetuity of this privation consists the eternity of future punishment. The scripture terms, from which eternal misery is usually understood, such terms as "condemnation," "destruction," "perdition," "damnation," etc., he thinks express the painful and penal consignment of the entire nature to disorganization and to the complete non-existence from which it originally came. Mr. Landis replies to Hudson, in his treatise *On the Immortality of the Soul and the Final Condition of the Wicked*, and many other writers have discussed the subject, especially in religious reviews and magazines.

It is significant that those who hold to this theory of late prefer to use instead of A. the term "conditional immortality." Three considerations may be noted as bearing on this subject: 1. The theory of man's tripartite nature, body, soul, and spirit, may be so held as to admit as possible a literal destruction (i.e. de-structuralization) of man, an utter and final disorganization, wherein body and soul, as forming man's organized existence, might cease to be, while the spirit, or the inmost essence of his being, might remain forever disembodied and disorganized; and thence might fitly be spoken of as "cast out into the outer darkness" and swallowed up in "the bottomless pit." 2. To establish the doctrine of entire extinction of a being like a man, existing in various departments, whether two or three, it is necessary that the origin of his complex being be understood. Was he created out of nothing, or out of something previously existing, or out of God as a child out of parents? 3. The theory of A. requires that the word "death" in the Bible, and in science, be taken to mean, when literally used, extinction of being. Thus the question arises whether the Bible gives "death" any meaning beyond destruction of the organism; and whether science can assure us that death in any case is more than dissolution of the organism, or destruction, i.e. de-structuralization. In the lack of affirmative answer on these points from either science or revelation, it would be found difficult to prove the theory of A., were it true. Thus the term A. is philosophically unfortunate.

ANNISTON, a city in Calhoun co., Ala., on the Louisville and Nashville and Southern railroads, 103 miles w. of Atlanta. It is the centre of a remarkably rich coal, iron and agricultural region, and is beautifully situated on the slope of Blue Mountain. It has iron foundries and furnaces, and manufactures cordage, cotton gins, pipe, railway cars, ice, lime, spokes, hubs, etc. It is the seat of a college for women, the Noble Institute for girls, the Noble High School for boys (both named from Samuel Noble, the founder of the city), good public schools and Barber Memorial Institute for colored girls. It enjoys good banking facilities and has an excellent system of waterworks. Pop. '90, 9998.

ANNOBON, or **ANNABON**, an island in the gulf of Guinea, about $1\frac{1}{2}^{\circ}$ s. of the equator, and belonging to Spain. Its basaltic, trachytic, and volcanic mountains render A. picturesque. It has an area of over 6 sq.m.

ANNONAY (anc. *Annoneum* or *Annoniacum*), a t. of the dep. of Ardèche, France, at the junction of the Deaume with the Cance, which unite in the center of the t., 37 m. s. from Lyon. It is an active and prosperous manufacturing town, the chief manufacture being that of paper, of which 300,000 reams are produced annually. There are also manufactures of glove-leather, mostly from kid skins, and of silk and cotton twist, and woolen cloth. The paper-mills of A. were established by the father of the celebrated aeronauts, Montgolfier (q.v.), who were born here, and to whom there is a monument in the Grande Place. The situation of the town is picturesque and remarkable; the houses are placed among rocks, and some of the streets are very steep. A large quantity of silk is produced in the neighborhood. Pop. '91, 17,626.

ANNUAL, in botany, a term employed to denote that the duration of the life of a plant is limited to a single year; within which the germination of the seed, all the functions of vegetation, the ripening of new seed, and the death of the plant, are included. The whole duration of life in the plants thus designated is indeed generally much less than a year, and in temperate and cold climates, falls within the brief period of the summer months. They as well as the plants generally called biennial, produce flowers and fruit only once. Some species are generally A., and others generally biennial; but whether an individual plant is A. or biennial, often depends upon the accidental circumstance of the season at which the seed germinates, and may therefore be artificially determined by the time of sowing. Peculiar circumstances also sometimes convert A. into biennial, or even perennial plants; and those which are mere annuals in one climate, are perennial, or even shrubby, in another, of which the castor-oil plant affords a notable example. Most kinds of corn are the produce of A. grasses; some of which, however, as wheat, in certain circumstances, prove of longer duration.

ANNUALS, a class of handsomely illustrated collections of prose and verse, imitating the gift-books of the Germans, and intended for Christmas, New Year's, and birthday presents. The first, *The Forget-me-not*, was published in London in 1823 and was followed by the *Literary Souvenir*; the *Keepsake*, edited by Lady Wortley and subsequently by the countess of Blessington; the *Book of Beauty*; the *Musical Bijou*; the *Comic Annual* started by Thomas Hood, and others, and in the United States by the *Gift*, and the *Token*, to mention a few of the many. Large sums were spent on these publications and large profits were realized, but while many authors of distinction were induced to contribute to them, the articles, as a rule, were of an inferior and highly sentimental nature and after 1840 the demand for annuals declined. The *Forget-me-not*, had an unparalleled life of twenty-two years; but the *Book of Beauty* and the *Keepsake*, survived it, the last-named ceasing to exist in 1856.

ANNUITY, from the Latin *annus*, a year, is a sum of money paid annually. The term, in its full meaning, expresses an obligation on one party to pay, and a right in another to receive the amount. The different kinds of annuities that may exist are as various as the conditions and fancies of those concerned in them; and it is impossible to define them all. An A. may be for the life of any person, however long that may be, becoming extinguished only by his death. It may be perpetual, so that as each enjoyer of it dies, his heirs may succeed to it. It may be on the life of the survivor of any number of persons—for instance, a father may leave to his five daughters an A. of £500 a year from his estate, to be enjoyed by the latest survivor, so that while the five are alive, they have £100 each; after the first death among them, the lapsed share is distributed among the survivors, giving them £125 each; and so on, the last survivor enjoying the whole £500. On the other hand, each might have a separate A. terminating at her death; and again, instead of either of these simple arrangements, there might be, and often is, a more complex adjustment, giving the survivors on each death a certain proportion only of the deceased's A. An A. may begin immediately, and stop on a contingency, such as the death of a person to whom the annuitant is heir. It may be "deferred," so as to begin to be payable only after the lapse of so many years; and then it may either be payable absolutely in perpetuity, or for a given number of years, or it may be payable to an annuitant only for the remaining years of his life.

It will thus be seen that there is infinite variety in the nature of annuities, and consequently, in the calculations regarding them. The fixed elements of such calculations,

independently of this variety, are in themselves double, being vital statistics, and the profit or interest of money. As to the former, they can only apply, of course, to the adjustment of annuities on a large scale. If a person should sell a single A.—that is to say, engage for a sum down to pay a certain person an A. for life—no study of vital statistics could make his bargain other than a chance; and though he went on the most approved tables, it might occur either that the annuitant dies immediately, leaving the whole purchase-money as his profit, or that the annuitant lives to extreme old age, and renders him a great loser by the bargain. But on a large, and especially on a national scale, the rate of mortality and the value of life may be so nicely rendered in statistics, that a market may be opened for the purchase and sale of annuities at their exact value—that is to say, at such a rate that the sum paid in from time to time by persons purchasing annuities, shall just serve to pay each annuitant's annual claim. Such vital statistics, however, can only be obtained through a very accurate and long-continued registration of births, deaths, and marriages (q.v.); and it is known that the government having adjusted the price of annuities by the celebrated Northampton tables, contracted a losing bargain with their annuitants as a body, and, without being conscious of it until afterwards, sacrificed a considerable amount of public money.

The second element, besides vital statistics, in the calculation of annuities, is the profit or interest of money. If this did not require to be considered, an A. of \$1 a year for 10 years would just cost \$10. But while paying the A., the person who has engaged for it is drawing the interest of the money. If he sold an A. of \$1 a year for 10 years for \$10, he would be drawing the interest of \$10 for the first year, \$9 for the second, and so on; and the annuitant's bargain would be to a like extent disadvantageous. As the interest of money may be various, so may this element of the calculation of an A.; and to calculate it with reference to future indefinite variations, is of course impossible. It will be seen at once that when the variety of kinds of A. have to be adjusted to different rates of profit, an immense field is opened for calculation. It is, in fact, a province of algebraic science in which several men have achieved reputations.

The interest, as it is termed, of the national debt is virtually a multitude of perpetual annuities. In a country where there is so much superabundant wealth, there is so vast an amount of capital for which people only want interest, that although the lenders of the money are not repaid by the government, yet when any one has invested in the funds, if he wants his money back, he is sure to find a person to take his place at something near to the price paid by him. This would not be the case were the quantity of these annuities in the market disproportioned to the number desiring to invest in them, and hence it is that when there is depression of trade, and money wanted to meet obligations, the funds fall. The government have the largest field of operation, and therefore it is natural to infer that their annuities are more closely adjusted to their actual value than those of insurance companies and other parties dealing in annuities can be. It may be mentioned, however, that, for the encouragement of the working classes to save and provide for old age and contingencies, the English government, through the banks, grants annuities on terms advantageous to the purchasers—that is, at less than their market value (see SAVINGS-BANKS).

ANNULET (Lat. *annulus*, correctly *anulus*, a ring), a term in architecture for a small fillet or band which frequently surrounds a column, etc. The A. is several times repeated in the molding which surmounts the shaft of a doric pillar, and is placed immediately under the ovolo of the capital.—A., a ring, a charge in heraldry of frequent occurrence.

ANNUNCIA'DA. 1. The religious order of the heavenly annunciation, or of the nuns of the annunciation of Mary, was instituted by Victoria Fornare at Genoa in 1682, after the rule of St. Augustine. All the convents of the order in France, Germany, and the Netherlands have disappeared since the French revolution. Some still exist in Italy. 2. Another order of the annunciation, or of nuns of Mary's announcement or the ten virtues, was endowed by John of Valois at Bourges in 1501, after its separation from Louis XII. In 1514, it was placed under the authority of the Franciscans. This order, which extended to fifty convents for the reception of poor gentlewomen, was broken up at the revolution. 3. The order of knights of the annunciation in Savoy, *ordine suprema dell' annuncziata*, known originally as the order of the neck-chain or collar, was instituted in 1360 by Amadeus VI., duke of Savoy. It received statutes from Amadeus VIII. in 1409; was renewed in 1518 under the name of the holy annunciation; and in 1720 was raised by Victor Amadeus to be the first order of the kingdom of Savoy. The king is always grand master. The knights, who, since 1720, are not limited in number, must be of high rank, and already admitted to the orders of St. Mauritius and St. Lazarus. They compose only one class. The decoration is a gold medal, on which is represented the annunciation, surrounded by love-knots. It is usually worn suspended by a simple gold chain; but the proper collar or chain of the order is composed alternately of love-knots and roses. On the roses are engraved the letters F. E. R. T., which some interpret *Fortitudo ejus Rhodum tenuit*, in allusion to the defense of Rhodes by Amadeus I., and which others hold to signify *Frappees, entres, rompes tous*. Since 1680, the knights wear on the left breast a star embroidered in gold. The four supreme officers of the order—the chancellor (always a bishop or archbishop), the secretary (usually the minister of foreign affairs), the almoner (usually the king's

first almoner), and the treasurer—wear the decoration round the neck, suspended by a sky-blue ribbon, accompanied by a star on the left breast. For details of costumes, etc., see Burke's *Book of Orders of Knighthood*, p. 250, *et seq.*

ANNUNCIATION, THE. The announcement by the angel to the Virgin Mary of the incarnation of Christ (Luke i., 26-38). The festival of the A. is kept on the 25th of Mar., which was for a long period the beginning of the legal year in England. The earliest allusion to this feast is in a canon of the council of Toledo, 656 A.D. Chrysostom calls it "the root of all festivals." With a view to natural fitness, the framers of the church calendar placed the festival of Christ's nativity nine months after the A.

ANOBIMUM. See BORER and DEATH-WATCH.

ANODE [Gr. *ana*, upwards, and (*h*)*odos*, a way], a term introduced into the science of electro-chemical decomposition (electrolysis) by Dr. Faraday to designate the positive pole, or that surface by which the galvanic current enters the body, undergoing decomposition (electrolyte). The negative pole, or that surface by which the current leaves the electrolyte, is called in the same nomenclature the *cathode* [*kata*, downwards, and (*h*)*odos*]. *Electrode* is the general term applied to either of these. The elements of electrolytes are called *ions* (*ion*, going). Such as go to the A. receive the name of *anions*, and those passing to the cathode, *cations*. Thus, in the decomposition of water by the passage into it of a galvanic current through two platinum plates, the water is the electrolyte; the platinum plate connected with the copper end of the battery is the A.; and the one connected with the zinc end, the cathode. The oxygen and hydrogen which are disengaged are the *ion*; the oxygen separating at the A. is the anion; and the hydrogen at the cathode, the cation. Anions and cations are more generally known under the name of electro-negative and electro-positive substances; but as these terms are considered by Dr. Faraday to imply certain supposed attractions for the positive or negative pole, the other terms have been employed by him to describe simply the part the substances play in electrical decomposition. See GALVANISM, ELECTRO-CHEMISTRY.

ANODYNE (Gr. *a*, privative, and *odynē*, pain), a medicine given to assuage pain. Properly, the term is applied to medicines, such as opium, which act on the nervous system, so as to decrease sensibility and induce sleep. See HYPNOTICS.

ANOINTING. See CHRISM, CORONATION, EXTREME UNCTION.

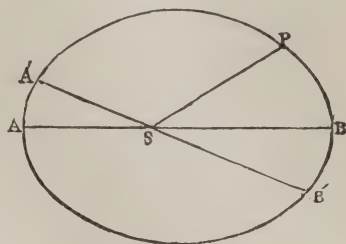
ANO'KA, a co. in e. Minnesota on the Mississippi river, 430 sq.m.; pop. '90, 9884. Agricultural products and lumber are the staples. Co. seat, Anoka.

ANO'LIS, a genus of saurian reptiles or lizards, native of tropical America, having teeth on the palate of the mouth as well as on the maxillary bones. They are remarkable for the power of inflating the skin of the throat, and for rapid changes of color of the inflated skin. They are entirely inoffensive, living on insects; are easily alarmed, and very rapid in their movements. There are several species, most of them bright green in color, varied with black.

ANOMALISTS AND ANALOGISTS. Proclus (q.v.) of Constantinople in the fifth century A.D. in his commentaries on the *Alcibiades I*, *Timeus*, *Republic*, and *Cratylus* of Plato sets forth two opposing theories on which the ancient students of language divided. These theories are alluded to by Aulus Gellius (q.v.), when he tells us that Publius Aigidius had argued most cleverly that words are not arbitrary signs of things, but are made because of some natural inherent connection with the thing signified. Gellius states also that this question was one often discussed by philosophers. The point at issue is briefly this, Did words arise *phusei*, *naturā*, naturally, or *thesei*, by convention. To this question two answers were returned by two opposing schools called the Anomalists and the Analogists. The Analogists held that words have in themselves an abstract and absolute rightness and suitability to the things described by them, whereas the Anomalists maintained that names are purely accidental and arbitrary signs of our conceptions. It is the conflict between realism and nominalism on philological ground. Proclus says that Pythagoras, Heraclitus, Epicurus, and Lucretius (and we may add Aigidius) were Analogists, while Democritus and Diodorus of Megara were Anomalists. Democritus is said to have advanced four arguments to show that language is the product of arbitrary convention. These are: First, the argument of homonymy, based on the fact that the same word may have several distinct and different meanings, as the Greek word *kleis* may mean either a key or the collar-bone; secondly, the same object may have different names; thirdly, there is an entire absence of analogy in many words; fourthly, proper names have often been changed, showing that they do not correspond to any internal trait or characteristic. The Analogists were capable of equally crude arguments, as we see from Gellius x., 4. He tells us that Aigidius, in support of his doctrine that words are not conventional, argued that when a Roman said *aos* (you), he pushed forward his lips and sent out his breath toward those with whom he was talking, moving his features also in a way corresponding to the meaning of the word. Plato is said to have been an Analogist, and the *Cratylus* is cited in proof. In this work Socrates, indeed, seems to support this view, but how far he embodies Plato's opinions it is difficult to assert. The *Cratylus* is a satire on the etymological conceptions of the Sophists, Plato perhaps wished to point out that

language has both a natural and a conventional element. Language may be defined as a gesture of the tongue, partly imitative, partly symbolical. Imitation is the principle lying close to its *origin*; the *development* was largely conventional. See Steinthal, *Philologie, Geschichte, und Psychologie*; Mervoyer, *Sur l'Association des Idées*; Farrar, *Chapters on Language*, and the authors therein cited.

ANOMALIS'TIC YEAR is the interval that elapses between two successive passages of the earth through its perihelion, or point of nearest approach to the sun. If the earth's orbit had a fixed position in space, this period would correspond with that of a sidereal revolution, or the time the earth takes after leaving any point of the heavens to return to it again; but the disturbing influence of the other planets causes the perihelion to advance slowly ($11''.8$ annually) in the direction of the earth's motion; so that the A. Y. is longer (4 minutes 39 seconds) than the sidereal. This will be better understood from the accompanying diagram, in which A'B'B' represents the elliptical orbit of the earth; S, the sun; A, the perihelion; and AB, the longer axis. When the earth, after leaving A, comes back to it again, after having completed a sidereal revolution, it finds the longer axis AB, and with it the whole ellipse, advanced to A'B', and it has still to describe an arc of $11''.8$ before it reaches its second perihelion A'. The length of the A. Y. is 365 days, 6 hours, 13 minutes, 49 seconds. It receives its name from the anomaly (q.v.).



Elliptical Orbit.

ANOM'ALY (Gr. *anomalía*, irregularity), the angle measured at the sun between a planet in any point of its orbit and the last perihelion. In the figure in the preceding article, if P, be a planet, A'B'B' its orbit, S, the sun, and A, the perihelion, the angle ASP is the A. It is so called because it was in it that the first irregularities of planetary motion were discovered. The A. was formerly measured from the aphelion, the opposite point of the ellipse; but from the fact that the aphelia of most of the comets lie beyond the range of observation, the perihelion is now taken as the point of departure for all planetary bodies.

ANONA. See CUSTARD-APPLE.

ANONA'CEÆ, a natural order of dicotyledonous or exogenous plants, of which the type is the genus *anona*. They are trees or shrubs, with alternate, simple, generally entire leaves, destitute of stipules; flowers usually green or brown, axillary, solitary, or two or three together; the calyx of 3 to 4 persistent sepals; the corolla of 6 hypogynous leathery petals, in two rows. The stamens are generally numerous; the filaments short; the anthers adherent, turned outwards, and with a large 4-cornered connective. See STAMENS. The carpels are usually numerous, separate or cohering; the styles short; the stigmas simple; the ovules inverted. The fruit consists of distinct or united carpels, sometimes succulent; the seeds attached to the suture; their external covering brittle; the embryo minute, in the base of the hard albumen.—There are about 300 known species, mostly natives of tropical countries. They are generally aromatic and fragrant in all their parts, and some species are employed medicinally; the dry fruit of *xylopia aromatica* is commonly used as pepper by the African negroes, and was formerly imported into Europe as ETHIOPIAN PEPPER or GUINEA PEPPER. The flowers of some species are of exquisite fragrance; others yield delicious fruits. See CUSTARD-APPLE and CHERIMOYER.

ANONYMOUS (Gr., nameless), a term applied to a book the author of which does not give his name; when an assumed name is given, the term PSEUDONYMOUS is used. Works of this class constitute one of the greatest difficulties of bibliography. French literature possesses an excellent *Dictionnaire des Ouvrages Anonymes et Pseudonymes* (2d ed., 4 vols.; Par., 1822-25) by Barbier, embracing the titles of about 24,000 works, with the names of those who are known or assumed to be the authors. The best work in English is Cushing's *Anonyms and Pseudonyms* (1888).

In this country, political articles are always A., as is also most of the periodical criticism; but on the other side of the channel, this practice is far from common. It is generally admitted that anonymity secures the independence of the critic, and enables him to write with greater freedom, vigor, and power; but it is true that he often abuses his advantage, and gratifies, under the veil of the A., the worst passions of his nature. Perhaps the most intolerable abuse of anonymity is the anonymous letter. The miseries, anxieties, and terrors which this cowardly method of assailing people has occasioned, must excite against it the indignation and abhorrence of all honorable-minded men. So possible are abuses of anonymity, that one of the popes (Paul II.), even punished all anonymous writers, on the ground that the suppression of their names was contrary to public policy. Charles IX., of France, enacted a similar prohibition, as did Louis XIII., in 1626.

ANOPLOTHE'RIUM (from the Greek *a*, privative; (*hoplon*, armor; and *therion*, a beast), a genus of extinct pachydermatous quadrupeds (see PACHYDERMATA), established by Cuvier from bones occurring in great abundance in the gypsum strata of the upper

eocene (q.v.) formation, near Paris. They are found also in the same formation in the *isle* of Wight and elsewhere. The teeth differ from those of all other pachydermata, extinct or recent. There are six incisors, two canines, eight præmolars, and six molars in each jaw—the dental formula thus agreeing with that of the fossil genus *palæotherium* (q.v.); but the teeth are arranged in a continuous series without intervening vacancies—a circumstance very remarkable, as it does not occur in any existing quadruped, but now appears in man alone. The molars of the upper jaw are quadrangular, those of the lower marked with a double or triple crescent of enamel, which forms prominent ridges. In some respects the teeth resemble those of the *ruminantia* (q.v.), or ruminating quadrupeds, between which and the pachydermata the A. has been thought to form a connecting link; but in some of the species originally included in this genus, and which are now sometimes ranked along with it under the name *anoplotheroids*, the teeth exhibit peculiarities which have led to the supposition that their food may not have been exclusively vegetable. The snout is not much elongated, and it is evident that there was no proboscis. The feet are terminated by two toes, as in the ruminantia; but they have always separate metacarpal and metatarsal bones, not a single *canon* bone. A considerable number of species of A. and of *anoplotheroids* have been determined, differing in size from that of a small ass to that of a hare, or even of a guinea-pig; so that the smallest species must have been smaller than any hoofed quadruped now existing, or any known to have ever existed. They differ also considerably in general appearance, some having had comparatively long limbs and a light and graceful form, whilst some were firmly built and heavy. Their habits may be supposed to have differed accordingly. The true *anoplotheria* were probably very similar in habits to tapirs. The powerful flattened tails of some are supposed to indicate an adaptation for aquatic life; others have smaller supplemental toes, besides the two hoofs. They form the genera *dichodon*, *dichobuné*, *xiphodon*, and *microtherium*.

ANOPLURA (Gk., unprovided with a tail). An entomological term applied to the order of insects unprovided with a tail, e.g., the louse.

ANOPSHEHR. See **ANUPSHAHR**.

ANOPSIA (Gk., lack of sight). A term used in anatomy of the congenital lack of sight, or to a monstrosity in which the eye is lacking. The English form, *anopsy*, is also current.

ANOREXIA (Gk., without desire). A lack of appetite. Also given in the more English form, *anorexy*.

ANORTHITE (Gk., *an*, neg., *orthê* sc. *gônia*, right angle, not in a right angle), a species of mineral of the feldspar family, occurring in small glassy crystals. It derives its name from its cleavage.

ANOSMIA (Gk., *a*, neg., *osmê*, smell), a medical term, denoting a loss of the sense of smell. Then it arises from a disease of the mucous membrane (called the *pituitary*, or *Schneiderian* membrane) which lines the nose and its cavities; it is called *organic* anosmia; when anosmia arises from no manifest cause, it is termed *atonic*.

ANOUKIS, or **ANAKA**, the "clasper" or "embracer;" an Egyptian goddess, personifying the lower world or hemisphere. She is represented with a red crown; while Sati, who personifies the upper world, has a white crown. A. seems to have been analogous to the Greek Hestia, or Vesta. No statues of A. have been discovered.

ANOURA (Gk., without a tail). A zoological term applied to such amphibians as have no tail. Such are the frog, the toad, etc.

ANQUETIL, LOUIS PIERRE, 1723-1808; a French historian; director of the academy of Rheims, and author of a history of that city. In 1759, he was prior of the abbey de la Roe, in Anjou, and soon afterwards director of the college of Senlis; later still, prior of Chateau-Renaud, near Montargis, which he exchanged for the curacy of La Villette, near Paris. In the reign of terror he was imprisoned in St. Lazare. He was an early member of the national institute, and employed in the department of foreign affairs. He left many historical works, for the most part crude and faulty in style.

ANQUETIL-DUPERRON, ABRAHAM HYACINTHE, an oriental scholar, was b. at Paris, Dec. 7, 1731. He commenced the study of theology in his native city, and afterwards prosecuted it at Auxerre and Amersfort. But his love of oriental languages drew him back to Paris, where he was assisted by the Abbé Sallier, overseer of the manuscripts in the royal library. As he now possessed a tolerable knowledge of Hebrew, Arabic, and Persian, he enlisted as a private soldier for India in 1754, to gratify his passion for learning; but Malesherbes and the Abbé Barthélemy rescued him from this degradation, and enabled him, through the royal munificence, to proceed independently. After his arrival in India, he traversed a great part of the peninsula, but finally fixed his residence at Surat, where there was a colony of Parsees, or fire-worshippers, with whose priests he

soon became so intimate, that they not only instructed him in the doctrines of Zoroaster, but also gave him some of their sage's books, written in Zend, in Pehlvi, and in Sanscrit. In 1762, he returned to Europe, having collected one hundred manuscripts, along with other curiosities. The Abbé Barthélemy now obtained for him a situation in the bibliothèque royale, and in 1763 he was elected a member of the académie des belles-lettres. In 1771, he published his *Zend-avesta*, in 3 vols., which contained the results of his researches. It consists of a literal translation of the *Vendidad*, as well as other sacred books of the Parsees, preceded by a narrative of his travels. This work created a great sensation when it first appeared. Until then, our only knowledge of the doctrines of the ancient Persians had been obtained from Greek and Roman sources, hostile Mohammedans, and eastern nations of a later origin. But A. now presented to the investigation of Europeans the original records of these doctrines, or, at least, records of incontestable authority. Unfortunately, his zeal far surpassed his patience and sagacity. He had not a sufficient mastery over the languages from which he translated. His translations are, consequently, anything but accurate. Since A. wrote, great advances have been made in oriental scholarship, and his labors are now in a great measure superseded. Among his other works we may mention his *Legislation Orientale*, 1778; *Recherches Historiques et Géographiques sur l'Inde*, 1786; *La Dignité du Commerce et de l'état du Commerçant*, 1789; *L'Inde en Rapport avec l'Europe*, 1790; *Oupnek'hat* (a selection from the theological portion of the Vedas), 1804. He d. at Paris, 17th Jan., 1805.

ANSALO'NI, GIORDANO, a Sicilian Dominican missionary, who died under torture, Nov. 1, 1634, in Nagasaki, Japan, whither he had gone from the Philippine islands, after learning the Japanese language in a hospital at Manila. He labored two years as a priest before he was discovered. Another priest and 69 converts suffered death with him.

AN'SARIES, or **ANSA'RIANS**, called also Nossairians, an Arab sect living in the mountains between the n. part of Lebanon and Antioch; found also in Antioch and other towns and villages of the coast. Little is known of their origin or history. They endeavor to conceal their doctrines from strangers, and of their own people none but male adults are admitted to the secrets. But it is evident that their tenets are a mixture of paganism and Mohammedanism, with some faint suggestions from Christianity. Their founder, Nossair, who lived about 890, taught that God appeared eleven times in human form, to Abraham, Moses, Jesus, Mohammed, and others; that he always encountered opposition, whereupon he returned to heaven, wrapped himself in a blue mantle, and resorted to the sun, which is therefore an object of their worship. They are said, by some writers, to look for a messiah who will be the twelfth person of human form in whom God will appear. Other accounts are that they hold to seven manifestations of the supreme deity, of which Ali is the only one to be adored. They believe in migration of souls, which for the faithful will be a progress from pure to more pure until they become stars; but sinners will be transformed into Jews, Christians, donkeys, dogs, and hogs. They practice circumcision and ablution, and pray in the open air three times a day. Promiscuous intercourse of the sexes is practiced on certain festivals, and their religious rites are believed to be vile. Though their religion inculcates benevolence, honesty, and patience, they are thievish and superstitious, yet hospitable. Each community is governed by a mokaddem, who is almost entirely independent. It is said that the most numerous of the three sects into which the A. are divided worship a beautiful young woman, who is elected goddess once in three years. Their number is estimated at 75,000. They are said to believe in a divine unity in three persons, the last two being created. The first, the supreme deity, is Manna or "meaning," the second Ism or "name," the third Bab or "dove." There is also a system of hierarchies wonderful for number; there are 14,000 "near ones," 15,000 "cherubim," 16,000 "spirituals," 17,000 "saints," 18,000 "hermits," 19,000 "listeners," and 20,000 "followers," besides prophets, apostles, and heroes. They profess to receive, among other sacred books, the Old and New Testaments, and the Koran.

ANSBACH. See **ANSPACH**.

AN'SCHÜTZ, KARL, 1813-79; royal musical director in Coblenz, and director in Nuremberg, Amsterdam, London, and New York, founding in the latter city the German opera, in 1862.

ANSE DE PANIER, a French term for arches which are the result of elliptical curves in section; an elegant form for bridge arches.

AN'SELM of Canterbury, a scholastic philosopher, was b. at Aosta, in Piedmont, in 1033. He led at first a dissipated life; and, like Abelard, wandered through France, after the fashion of the scholars of those days, disputing wherever he could find an adversary. Attracted by the reputation of Lanfranc, he went, in 1060, to study at the monastery of Bec, in Normandy. Three years after, he became prior, and in 1078, abbot of this monastery, the most famous school of the 11th century. Lanfranc, who in the meantime had gone to England, and became archbishop of Canterbury, d. in 1089; and the diocese remained four years without a successor, till, in 1093, A. was appointed. He was distinguished both as a churchman and a philosopher. His numerous embroil-

ments with William Rufus and Henry I., and the unbending spirit which he displayed in these, even when subjected to banishment, indicate the vigor and resoluteness of his character, as much as his writings exhibit the depth and acuteness of his intellect. In 1720, Clement XI. expressly placed him in the list of church authorities. A. was a second Augustine, superior to all his contemporaries in sagacity and dialectical skill, and equal to the most eminent in virtue and piety. Embracing, without question, the doctrines of the church, mostly as stated by Augustine, and holding that belief must precede knowledge, and must be implicit and undoubting, he yet felt the necessity of a religious philosophy, urged the duty of proceeding from belief to knowledge, and sought to reduce the truths of religion into the form of a connected series of reasonings. It was for this purpose he wrote his *Monologium sive Exemplum Meditandi de Ratione Fidei*. In his *Proslogium*, otherwise entitled *Fides quærens Intellectum* (faith seeking intellect), he strove to demonstrate the existence of God from the conception of a perfect being. This ontological proof, however, has never been held satisfactory. His writings, *Cur Deus Homo*, and *De Concordiâ Proscientie et Prædestinationis*, made an epoch in Christian philosophy. A. may justly be reckoned the earliest of the schoolmen, although Alexander of Hales (q.v.) was the first who completely systematized in the scholastic manner the doctrines of the Catholic church. He d. 21st April, 1109, and was buried at Canterbury. The day of his death is observed in the Roman Catholic church. See Rémusat's *Anselme* (1858), Church's *A.* (1870), and Rule's *Life and Times of Anselm* (1883).

ANSER. See ANAS and GOOSE.

ANSGAR, or ANSCHARIUS, styled the apostle of the north, on account of his labors to introduce Christianity into Denmark, Sweden, and northern Germany, was b. in Picardy about the year 801 A.D. Under the patronage of Louis le Débonnaire, he went, with his colleague Audibert, to preach the doctrines of Christianity among the heathen Northmen of Schleswig, where he suffered many persecutions; but had nevertheless such success that, in 832, the pope established an archbishopric in Hamburg, and A. was appointed the first archbishop. Here he passed through many difficulties, having to save his life by flight in 845, when the Northmen and Danes under Eric I. plundered Hamburg. He afterwards made several missionary tours in Denmark and Sweden, and d. Feb. 3, 864, at Bremen, where a church was named after him. The Roman Catholic church has canonized him.

ANSON, a co. in s. North Carolina, on the Rocky and Yadkin rivers; 460 sq.m.; pop. '90, 20,027, incl. colored. It has an undulating surface and productive soil; agriculture is the chief industry. Co. seat, Wadesborough.

ANSON, GEORGE, LORD, Admiral, b. on 23d April, 1697, at Shugborough, in Staffordshire. From an early period he manifested a predilection for a sea-life. In 1716 he served as second lieutenant under Norris; next under Byng in 1718, against the Spaniards; and was made a captain in 1723. In 1739, when war with Spain broke out, he was recalled from the Carolina station, on which he had been placed since 1724, and received the command of the fleet in the South sea, with instructions to inflict whatever injury he could on the Spanish commerce and colonies, and sailed from England in Sept., 1740. The preparations for this cruise had been made in the most slovenly manner. Both vessels and stores were bad, and the sailors were old Chelsea pensioners; yet A., in spite of these disadvantages, achieved a brilliant reputation by the heroism, prudence, diligence, and humanity he displayed. After his little fleet of seven vessels had been scattered by a storm, in doubling cape Horn, he landed at Juan Fernandez, where he was soon joined by three of his ships, which arrived in a dismantled condition. While he remained on this island, he exhibited his native tenderness of character by the assiduity with which he cared for the sick. Under these disadvantages, he made several prizes, including a Spanish galleon from Acapulco, with a cargo worth £400,000. After this he returned to England; and arrived at Spithead, June 15, 1744, having circumnavigated the globe in three years and nine months. His perilous cruise greatly extended the knowledge of navigation and geography. As a reward for his services, A. was made rear-admiral of the blue (1744); and in 1747, having defeated the French Admiral Jankière, at cape Finisterre, he was made baron of Soberton; and four years later, first lord of the admiralty. In 1761 he was made admiral of the fleet. He d. June 6, 1762.

ANSONIA, a city in New Haven co., Conn., on the Naugatuck river, 11 m. w. of New Haven, and on the Naugatuck and Berkshire divisions of the New York, New Haven, and Hartford, and the New Haven railroad; also connected with Derby and Birmingham by an electric railroad. Ansonia, which was set off from Derby in 1889, and chartered as a city in 1893, has churches, a public library, banks, and important industries, especially machine shops, clock factories, electrical works, and manufactories of articles in brass and copper, etc. Pop. 1880, 3355; 1890, 10,342.

ANSPACH, or, more properly, ANSBACH, a. t. of Bavaria, the capital of the circle of Middle Franconia (*Mittel-Franken*), on the Rezat, 25 m. s. w. from Nürnberg. It has manufactures of cotton and half-silken fabrics, tobacco, earthenware, playing-cards, cutlery, and white lead; also a considerable trade in wool, flax, and corn. The situ-

ation is pleasant, but there are no remarkable buildings, except the deserted palace of the former margraves of A., surrounded by gardens, and the church of St. Gunibert, said to occupy the site of a church erected in the 8th c., around which the t. grew. The margraves of A. were a branch of the family of Hohenzollern. The last of them sold his possessions in 1791 to Prussia; and in 1806, Napoleon I. transferred A. to Bavaria. Pop. '90, 14,200.

ANS PACH, ELIZABETH BERKELEY, Margravine of, 1750–1828; daughter of Augustus, earl of Berkeley, and wife of the earl of Craven, who d. in 1791, after which she married the margrave of Anspach. She was highly accomplished, and of singular versatility, writing and performing dramas, and composing many biographical memoirs.

ANSTED, DAVID THOMAS, an English physician, b. 1814; educated at Cambridge, and professor of geology at King's college, London, and at the college of civil engineers at Putney. For many years he was engaged on works illustrating the application of geology to engineering and mining. He d. 1880. He was noted as a consulting engineer. Besides geological works Dr. A. published *Scenery, Science, and Art, The Channel Islands, Correlation of the Natural History Sciences, The Ionian Islands, and Physical Geography*.

ANSTEY, F. (T. ANSTEY GUTHRIE) an English barrister who came rapidly into prominence as an author in 1882–84. In 1882 he published the tale, *Vice Versa*, which met with great success. Its plot dealt with the old idea of a change of identity between father and son, but his original way of working out the idea won a reputation for its author. Soon after, *The Giant's Robe* appeared, and was also very well received. Since then he has written *The Tinted Venus, The Black Poodle, The Pariah, and Tourmalin's Time Cheques* (1891).

ANSTEY, CHRISTOPHER, 1724–1805, an English poet; educated at Eton and designed for the church, but failing to get his degree, he returned to private life. He entered the army, and sat in parliament. Among A.'s works are the *New Bath Guide*, the *Election Ball*, and some others now forgotten.

ANSTRUTHER (EASTER and WESTER), two contiguous royal burghs of Fifeshire, 9 m. s. of St. Andrews, with which, along with Crail, Cupar, Kilrenny, and Pittenweem, they join in returning a member to parliament. Fishing, fish-curing, and tanning are the chief occupations. East A. is the birthplace of Dr. Chalmers, Tennant the poet, and Goodsir the anatomist. Pop. of both burghs, and Kilrenny, about 4500.

ANT, *Formica*, a Linnaean genus of hymenopterous insects, now divided into several genera, which form a family called *formicidae*. The English name is contracted from *emmet*, still also occasionally used. Another old English name, not now in frequent use, is *pismire*. The species are numerous, and are generally distributed over temperate and tropical regions. Their habits and instincts are extremely interesting, and have attracted attention from remote ages.

Ants are small insects, but of extraordinary muscular strength. They carry loads of ten or twelve times their own weight, and display great activity. They have a triangular head; the antennae are geniculate; the jaws strong; the ligula or lower lip small, rounded, vaulted or spoon-like; the thorax compressed at the sides; the abdomen nearly oval, the pedicle which joins it to the thorax forming in some kinds a single and in some a double scale or knot. They live in societies, often very large, which consist, as in bees, of *males, females, and neuters*. The neuters are females with imperfect ovaries, transformed at an early stage of their existence, and are distinguished into two classes, *workers and soldiers*, the former constituting the greater portion of each society, the latter somewhat differing from them in larger size and larger and more powerful head. The ordinary work of the society is performed by the workers: the principal part in warfare, defensive or offensive, is taken by the soldiers. The males and females constitute but a small portion of each community. They have delicate glistening wings; but the neuters have no wings, and the thorax is smaller and more compressed. The males are smaller than the females, and the workers are rather smaller than the males. The females and neuters of some kinds (genera *ponera, myrmica, attia*, and *cryptocerus*) are armed with stings; other kinds (*formica* and *polyergus*) have no sting, but have the power of ejecting a peculiar volatile acid, FORMIC ACID (q.v.), from a small sac in the abdomen; by this means effectually repelling many adversaries, to which the pungent fumes are intolerable. Small animals are soon killed by the vapor of an ant-hill; and a dog has been known to retire yelling from the effect upon his eyes, either of the vapor, or of a discharge of the fluid itself. It is said that when those ants that are unprovided with a sting make use of their mandibles to inflict a bite, they curve round their abdomen, so as to be ready immediately to squirt this acid into the wound.

The winged ants mostly appear in autumn, and perish before the commencement of the cold weather; a few surviving to found new colonies and perpetuate the race. The neuters pass the winter in large numbers in a torpid state, and resume their activity on the return of spring. The nests of ants, after midsummer, are usually found to contain winged males and females mixed with the wingless neuters, which, however, restrain them, and particularly the females, from making their escape into the air, until the pairing season, when they ascend into it in immense swarms, those from many ant-hills sometimes uniting their myriads, rising with incredible velocity in distinct

columns, and soaring to a great height. "Each column looks like a kind of slender net-work, and has a tremulous undulating motion. The noise emitted by myriads and myriads of these creatures does not exceed the hum of a single wasp. The slightest zephyr disperses them." They occasionally, however, make their appearance in such prodigious numbers that the air is obscured by them.—The pairing of ants is supposed to take place in the air. Some of the females which escape destruction by their enemies, or by the elements, found new colonies, in which at first they perform the work usually assigned to neuters. Some, however, are seized by the neuters of ant-hills near which they fall, and there is even reason to think that these go out to search for them; they are stripped of their wings, and forcibly conducted to the habitation, the number of whose inhabitants is to be increased by their multitudinous progeny. They are fed and treated with apparent respect, like the queen-bee among bees; but a society of ants, unlike one of bees, often contains numerous females, each thus treated and equally employed in the important work of laying eggs. Unlike the queen-bees, also, they are invariably denuded of their wings; nor is this always done by the neuters, to prevent their escape, but the female ant, after fecundation, has been seen to denude herself of her own wings, as now superfluous appendages.

The eggs of ants are so small as to be scarcely visible to the naked eye. The mother drops them at random in her progress through the nest; but the workers, of whom some are always in attendance on her, immediately seize them, moisten them with their tongue, and lay them in heaps in particular apartments of the nest. They continue to watch them, and to remove them from one quarter of the nest to another, apparently in order that they may always enjoy a suitable temperature, and perhaps in order to avoid any excess of moisture. In a few days the young larvæ are produced; and these require the unremitting care of the workers, which feed them, disgorging into their mouths, for this purpose, a viscid substance, supposed to be the ordinary food of the species, prepared for their use by a sort of half digestion. They are also extremely careful to keep the young brood clean, by constant application of their tongue and mandibles; and a great amount of labor is daily expended upon them in conveying them from the inner apartments of the nest towards the surface after sunrise, when the weather is fine, and back again before sunset, or when the weather becomes cold, or there is a prospect of rain. The same care is extended to the pupæ. The larvæ and pupæ are the white objects which the workers are seen hastily seizing and carrying off to places of safety, when an ant's nest is broken open; and the resemblance of which, particularly of the pupæ, to grains of barley, is supposed to have contributed to the general belief, that ants amass stores of corn for winter food. The larvæ have no organs of locomotion. The pupæ are enveloped in delicate silken cocoons, and unlike those of other insects, require assistance to extricate themselves from them when they have attained their perfect state. This assistance also is afforded by the workers.

The whole supplies of food for the inmates of the nest are brought to it by the workers. The food of some kinds is exclusively or chiefly animal; that of others, vegetable. The provisions carried to their nests by the ants of Britain and other countries in which the winter is cold are apparently not intended for winter, when the creatures are entirely torpid, but only for present use; and few, if any of the species, feed on grain or seeds. But Colonel Sykes discovered at Poonah a species of ants (*atta providens*), which not only store up provisions, but of which the stores consist of the seeds of a species of millet; and Mr. Moggridge has recently determined by careful observation that large stores of grain and seeds are laid up by some of the ants of the south of Europe, especially *atta barbara* and *atta structor*. M'Cook gives a most graphic account of the harvesting habits of the agricultural ant of Texas. The grain and other seeds stored up by ants seem, in some way not yet known, to be deprived of the power of germination. The ant has long been a sort of proverbial type, not only of industry, but of provident care for the future. Some ants, however, collect and carry to their nests substances which are not intended for food, but for the construction of the nest, and particularly for closing its apertures in cold or wet weather.

The vegetable substance which ants seem chiefly to use as food is sugar; and to this, wherever it is to be found, they seem to be guided by a very acute sense of smell. *Honey-dew*, the saccharine excretion of the *aphides* (see APHIS), is a favorite food of many species; and with this are connected some of their most extraordinary instincts; for not only do they climb the plants on which the aphides abound, that they may obtain this food, but they have been seen to wait beside them for new drops, and even to touch them with their antennæ, in order to cause the drops to flow, patting the abdomen of the aphid on each side alternately and rapidly; the ant, after the drop has been obtained, passing on to another aphid. The whole process has been likened to the milking of cattle. Even more wonderful things are asserted on this subject, as that particular ants seem to regard particular aphides as their own property, and are ready to fight in defense of their right to them—that, to secure them for themselves, they convey them from one place to another—and that the *aphis radicum*, which derives its nutriment from the roots of grass and other plants, is actually kept in large numbers in the nest of the yellow ant (*formica flava*), in order that there may be always at hand a copious supply of food, these aphides and their eggs sharing the solicitude of the ants equally with their own eggs and young. Things so wonderful are ascertained beyond dispute in regard to the instincts of

ants, that even such statements as these must not be hastily rejected as incredible, and certainly they express the beliefs of scientific observers. See HONEY ANT.

Ants which feed upon animal food render important service in clearing away every vestige of the flesh of dead animals, and so preventing corruption; and very beautiful skeletons of small animals have been obtained by burying the animal for a short time in an ant-hill. But ants also attack living animals: insects of comparatively large size fall a prey to them, and in tropical countries, birds, reptiles, and small quadrupeds are sometimes devoured by their vast swarms, which strip the bones of the animal perfectly clean with wonderful rapidity. Domestic animals, at least when sick, are not safe from them, and man himself regards them with dread. About 100 years ago, vast numbers of a particular kind of ant (*F. saccharivora*) appeared in the island of Grenada. This species makes its nest under the roots of plants, and the sugar-canes were so weakened and injured in consequence, that the plantations became nearly unproductive. "They descended from the hills like torrents, and the plantations, as well as every path and road for miles, were filled with them. Rats, mice, and reptiles of every kind became an easy prey to them; and even the birds, which they attacked whenever they lighted on the ground in search of food, were so harassed, as to be at length unable to resist them. Streams of water opposed only a temporary obstacle to their progress; the foremost rushing blindly on certain death, and fresh armies instantly following, till a bank was formed of the carcasses of those which were drowned, sufficient to dam up the waters, and allow the main body to pass over in safety below. Even fire was tried without effect. When it was lighted to arrest their route, they rushed into the blaze in such myriads as to extinguish it." A reward of \$100,000 was offered in vain for an effectual means of destroying them; but in 1780 a hurricane which tore up the canes, and exposed their habitations to a deluge of rain, freed the island from this plague.

The habitations of ants are very curiously constructed, displaying great ingenuity, although with great diversity in the different species. The greater number of species form their habitations in the ground. These rise above the surface in the form of a dome; hence the name *ant-hills* commonly given them. The largest ant-hills formed by any northern species are those of the large red or horse ants (*formica rufa*), which are sometimes as big as a small haycock; but travelers in South America describe ant-hills of 15 or 20 ft. in height. The nest of *F. rufa* is outwardly of rude appearance—a confused heap of such portable materials as were within reach; but within, it contains numerous small apartments, of different sizes, arranged in separate stories, some deep in the earth, some above its surface, and communicating with each other by means of galleries. Use is made of the earth excavated from below to mix with other materials in the construction of the upper parts of the fabric. Many species of ants, sometimes called mason ants, construct habitations by a still more elaborate masonry, making use, for this purpose, of soft clay, which they spread and mold by means of their mandibles and feet, appearing all the while to examine their work by their antennæ. The partition-walls of the galleries and apartments of the *formica brunnea* are about half a line thick, and about $\frac{1}{4}$ in. high; the roofs are somewhat arched, and pillars are frequent in this marvelous architecture. M. Huber saw a working-ant of another species (*F. fusca*), without assistance, make and cover in a gallery which was 2 or 3 in. long, and of which the interior was rendered perfectly concave. There are other species, sometimes called carpenter ants, which make their habitations in the trunks of old trees, gnawing the wood into apartments and galleries, with floors and partitions as thin as card. *Formica flava* forms its partition-walls of a sort of *papier-mâché* of saw-dust, earth, and spider's web. *F. smaragdina*, an East Indian species, forms its nest of a thin silk-like tissue. *F. bispinosa*, in Cayenne, makes a felt of the down which envelops the seeds of the *bombax criba*. An East Indian species, *myrmica kirbii*, forms a globular nest of a congeries of tile-like *laminæ* of cow-dung, the interior exhibiting an assemblage of apartments and galleries. Some Australian ants form their nests of the leaves of trees glued together, after being first brought into the proper position by the united strength of multitudes.

Of the ants which form their nests in the ground, some, instead of constructing ant-hills, seek the protection of stones, roots of trees, etc. This is the case with some of the British species, and also with the sugar-ant of the West Indies, already mentioned.

Many interesting anecdotes are on record illustrative of the instincts of ants, and of the sagacity which they seem to possess. They appear also to have some power of communicating with each other, in which it has been supposed that the antennæ are chiefly employed. Some such power might be supposed to be necessary, if we could venture to reason from analogy upon such a subject, not only to their architectural and other ordinary operations, in which many must take part, systematically and conjointly, but also in their predatory and warlike excursions; for these also some of the species have. If, during the predatory excursions of the *atta cephalotes* (a South American species), an intervening space occurs which they cannot cross, some of the creatures link themselves together—as monkeys, in like circumstances, have been known to do—forming a bridge over which the main body passes. Ants are, in general, both courageous and pugnacious. Many battles take place among them, both between individuals and large parties; and after a battle, combatants may be found locked in each other's

arms, as having died together in the struggle. More extraordinary than anything of this kind, however, is the fact, sufficiently ascertained, that some species of ants go on regular forays to carry off the larvæ and pupæ of certain other species, which they carry to their own habitations to rear and employ them as slaves in the work which might be regarded as properly belonging to workers of their own race—a fact to which no other at all analogous has yet presented itself in natural history. The species known thus to make and keep slaves are *polyergus rufescens* and *formica sanguinea*, both sometimes called amazon ants. It has been noted as a curious circumstance, that the kidnappers are red or pale-colored ants, and the slaves jet black. The kidnapping excursions take place only at a particular period of the year, when the nests of the black ants contain the neuter brood. The army of red ants (*P. rufescens*) marches forth, the vanguard, which consists of 8 or 10 only, continually changing; and on their arriving at the nest of the negro ants, a desperate conflict ensues, which ends in the defeat of the negroes; and thereupon the red ants, with their powerful mandibles, tear open the now undefended ant-hill, enter it, and emerge, carrying the pupæ in their mouths, with which they return in perfect order to their own nest. The pupæ are there treated with great care, and spend their lives among the red ants, excavating passages, collecting food, carrying larvæ, etc., as if this had been their original destination. The amazon ants are not natives of Britain, although plentiful in some parts of Europe.

Formic acid has been employed as a stimulant in gout and paralysis, and is sometimes exhibited in continental practice by means of *ant-baths*, which are prepared by boiling crushed ants, or whole ant-hills, and immersing the diseased limb in the steam.

TERMITES (q.v.), or WHITE ANTS, are very different from the true ants; belonging to the order *neuroptera*. See APHIS; Lubbock's *Ants, Bees and Wasps* (1882); White's *Ants and Their Ways*; McCook's *The Agricultural Ant of Texas* (1880); Bates, *A Naturalist on the Amazon*.

ANT—or ANTI. A Greek prefix found in many English words, denoting opposition.

ANTACIDS are medicines which correct abnormal acidity of the stomach and intestinal canal by directly combining with the free acid that may be present. Their action is obviously merely temporary, as, unless combined with other medicines, they do not correct the morbid condition which causes the undue acidity; and their too prolonged use must be carefully avoided, since, at all events, some of these medicines, as the alkalies and their carbonates, are liable to induce a state of general anæmia, morbid deposits in the urine, and a series of symptoms not unlike those of scurvy. Antacids are best given in association with vegetable tonics; and for the reasons already stated, their administration must be carefully watched, and should be occasionally omitted. Dr. Nelligan makes the following excellent remarks on the particular remedy to be employed for special forms of acidity: "When the acid exists in the stomach in the gaseous state, ammonia or its carbonates should be preferred, as, in consequence of their volatility, a gaseous acid which would elude the action of the fixed alkalies, may be neutralized by them. If the acidity be present in the lower bowel, as in the cæcum or colon, magnesia or lime ought to be administered, as being less likely than the other antacids to be neutralized or absorbed before it reaches that portion of the intestinal canal. When the acid exists in the urinary organs, the alkalies will be found best adapted, as they have a tendency to act more directly on the kidneys; and when it is *lithic* (or *uric*) acid which preponderates in the urine, the preparations of lithia or potash should be preferred to those of soda, as the salts formed by the two former with the acid in question are much more soluble than those formed with the latter. In persons of a corpulent habit of body, potash is to be preferred to ammonia or soda when the use of an alkali is indicated. And, finally, ammonia and its preparations are best adapted for the old and debilitated, as also for those of enfeebled constitution." The antacids include solutions of ammonia, lime (commonly known as lime-water), potash, and soda, various carbonates of these substances, magnesia and its carbonates, and the carbonate and citrate of lithia.

ANTE. See PILASTER.

ANTEÛS, in fable, a giant in Lybia, son of Poseidon (Neptune) and Ge (the earth). He compelled all strangers passing through the country to wrestle with him, but when he was thrown he received fresh strength from contact with his mother earth, and proved invincible. With the skulls of those whom he had slain, he built a temple to his father. Hercules discovered the secret of his renewal of strength, lifted him from the earth, and strangled him. This struggle is a favorite subject in ancient sculpture.

ANTAGONIST MUSCLES. Every muscle is opposed in its action by another muscle, or elastic ligament; e.g., in the arm the triceps extensor is opposed by the biceps flexor and brachialis anticus; the diaphragm, whose action aids in expanding the chest, is opposed by the external abdominal muscles. The diastole of the heart in vertebrates is best explained by elasticity, as it exerts very little power. The predominance of power in antagonist groups of muscles determine the position of different parts of the body when at rest, the naturally bent positions of the fingers during sleep showing the prevailing power of the flexors. The natural balance of muscles is sometimes disturbed by disease.

ANTALCIDAS, a Spartan politician, who made himself conspicuous in a very perilous crisis of the history of his nation by the skillful character of his policy. Some time after the Peloponnesian war, it seemed as if Athens were destined to regain the supremacy she had lost. The Greek states rallied round her; while Conon, an able and vigilant Athenian admiral, and his ally, Pharnabazus, the Persian, were everywhere victorious in their naval encounters with the Spartan fleet. It became necessary, therefore, that communications should be entered into with the Persian king, from whom the confederate Greeks drew their chief resources. A. was chosen ambassador to Tiribazus, satrap of Western Asia. On hearing this, the Athenians grew alarmed, and sent Conon to frustrate the schemes of the former; but Tiribazus took A.'s part, and the result was, that Conon was thrown into prison, and A. secretly received money to enable Sparta to continue the war. At first, Artaxerxes, the Persian monarch, was dissatisfied with the conduct of his satrap, recalled him, and put Struthas, a friend of Athens, in his place; but through a complication of circumstances, which it is unnecessary to mention, A. was subsequently completely successful in securing the goodwill of Artaxerxes. He was now appointed admiral of the Spartan fleet, and assisted by Tiribazus, Ariobarzanes, etc., swept the seas until Athens became desirous of peace. For various reasons, so was Argos and Sparta herself. Tiribazus therefore assembled deputies from the Greek states, and, in the name of his master Artaxerxes, read the famous declaration or treaty of peace, to which all the members present agreed, and which is known in history under the name of "the peace of Antalcidas," as being the result of the latter's able diplomacy. Its three great points were as follows: 1. That all the Greek towns on the mainland of Asia Minor, together with the islands Clazomene and Cyprus, should remain under the protection of the Persian king. 2. That all other Greek towns, large and small, should be independent; but that the islands of Lemnos, Imbros, and Scyros should belong to Athens. 3. That war should be declared against whatever state refused to accept these points. After this peace, the history of A. becomes doubtful and obscure. He seems to have lost favor with the Persians, and Plutarch even leads us to suppose that, sickened by misfortune and the loss of reputation, he voluntarily starved himself to death; but this story is not credited by scholars, both on account of its intrinsic improbability and its apparent disagreement with the statements of other writers.

ANTANACLASIS, in rhetoric a figure in which a word is repeated in a sense different from its first use, to give additional force to the expression; as the remark of Benjamin Franklin when he was about to sign the declaration of American independence: "we must all hang together, or we shall assuredly all hang separately."

ANTANANARIVO', or **TANANARIVO**, the capital city of Madagascar, and seat of the government. Population with suburbs about 100,000. It is situated on a hill, in an undulating district, at an elevation of 7000 ft. above the level of the sea. It is exposed to fearful hail and thunder storms. The approach to it from Tamatave, the chief seaport, is extremely tedious and difficult, owing to the want of roads. It is, in spite of this, the seat of considerable trade and industry. The royal palace occupies the summit of the hill; adjoining are the dwellings of the chief officers of government; and below these, covering the slope of the hill, and built on terraces, are the houses of the other inhabitants, constructed almost entirely of wood. The people exhibit a considerable aptitude for civilized usages; and, thanks to missionary enterprise, considerable progress has been made towards the adoption of European habits. Trouble between the natives and the French, who had established a virtual protectorate over the island, led to a French military expedition in 1895. French forces occupied the city, and forced the queen to sign a treaty recognizing the French protectorate.

ANTAPHRODISIACS. See **ANAPHRODISIACS**.

ANTAR, or **ANTARA**, a celebrated Arab chief of the 6th c., one of the seven poets of Arabia, whose prize poems, embroidered in golden characters on a silken ground, were hung up on the gate of the Caaba, and thence called *moallakat*—i.e., the suspended. In the poem of his that has descended to our day, he paints his warlike deeds, and his love for Aba. His courage and heroism during a 40 years' warfare between two Arab tribes, and his constancy in love, were long dear to the memory of his countrymen, and appear to have formed the groundwork of the voluminous romance called *Antar*, commonly ascribed to Asmai, and reduced to writing as early as the days of the calif Haroun al raschid, in the 8th century. This work, which has come down to us in a later and much corrupted form, gives an attractive and faithful picture of Bedouin life, and is rich in epic interest, although too monotonous to satisfy the taste of the European reader. In the east, however, it still supplies the favorite themes of the professional story-tellers who haunt the coffee-houses. A poetical translation of it into English was made by Terrie Hamilton in 1820.

ANTARCTIC CURRENT, a drift, traceable first along the shores of Victoria land in the southern region of perpetual frost, which carries ice and cold water along the western coast of South America. It is much like the gulf stream, only the latter warms the cold n.w. of Europe, while the former cools the tropic heats of western South America.

ANTARCTIC LANDS, the unexplored space beyond 70° s. lat., comprising an area of about 4,700,000 sq. miles. The latest information and speculations about this region.

laid before the British association, favor the supposition that there is no continuous Antarctic continent, but a congeries of low continental lands and islands connected by bridges of ice which form part of the solid ice cap covering the whole to the height of about 1400 ft. The region is intersected by continental chains, like the range between 55° and 95°, which includes Peter the great island, Alexandra land, Graham land, Adelaide island, and Louis Philippe land; also by at least one volcanic range, discovered by Ross in 1841, which stretches from Balleny islands to lat. 78° s., and reaches a height of 15,000 ft. The A. lands are surrounded by a fringe of ice, which extends in a perpendicular cliff of an average height of 230 ft., outside of which ice extends seaward in winter 20 ft. thick or more, and in summer this floe gives place to pack ice and drifting bergs. It is reasoned that the uniform height of the ice does not exceed 4400 ft., because any addition increases the pressure and lowers the mass which is melted away at the bottom by the internal heat of the earth. See POLAR EXPEDITIONS.

ANTARCTIC OCEAN, the sea round the south pole, as the *Arctic ocean* is the sea round the north pole. It is otherwise called the Southern ocean, comprising all the sea to the south of the Atlantic, the Indian, and the Pacific oceans. In this view, the A. O.'s northern limit may be conveniently divided into three straight lines—the *first* between cape Horn in South America and cape Agulhas in Africa; the *second*, between cape Agulhas and the southern extremity of the Auckland islands as an appendage of New Zealand; and the *third*, between the southern extremity of the Auckland islands and cape Horn. This appears to form the true boundary of the polar regions of the southern hemisphere. The most northerly isles which it incloses are New Georgia, at the mouth of the Atlantic, and Kerguelen's land, at the mouth of the Indian ocean. The latter tells its own story in its other title of "The Land of Desolation;" and the former presented to Cook, even in the middle of summer, perpendicular cliffs of ice, and valleys covered with everlasting snow.

It is usual, indeed, to define the A. O. and the corresponding ocean to the north, as being contained each within its own polar circle. But with regard to both oceans alike, this definition appears to be inadmissible. It is only at two points—the head of the Pacific and the head of the Atlantic—that the Arctic sea can possibly reach the Arctic circle at all; while, in point of fact, it overlaps it at Behring's strait by nearly a degree, and falls several degrees short of it between the northern half of Norway and the s.e. shore of Greenland. The A. O., again, is nowhere practically limited by the definition in question: not a single voyager hesitates to use the expression long before he arrives at lat. 66° 30' s.; nor yet is a single authority consistent in the use of the arbitrary nomenclature.

The A. O. has been explored, more or less satisfactorily, by various navigators, as far as 79° s. With a few exceptions, however, little of it is accurately known, the difficulties and dangers of its navigation rendering thorough and continuous investigation almost impracticable. The names that will recur in their proper places are New Georgia, Kerguelen's land, Sandwich land, New South Shetlands, New Orkneys, Enderby's land, Graham's land, Balleny, Sabrina, and Victoria land. See an account of a voyage in Antarctic regions in *Geographical Journal*, II. (1893), p. 429.

Taken as a whole, these lands bear a very small proportion to the extent of an ocean which embraces half the latitudes and all the longitudes of the southern hemisphere, exceeding its kindred sea to the north, as a glance at the map will show, by nearly half of Asia and North America, and the whole of Europe. Such of these lands as are really accessible at all times have been more or less valuable in connection with the whale and sea fisheries. The features of the A. O. itself may be briefly stated to be constant fogs, baffling currents, innumerable icebergs, and magnificent manifestations of the aurora australis. On the coast of Victorialand beyond the parallel of 70°, two mountains have been observed to be of a height altogether unequalled in such a latitude, — mt. Terror, of 10,000 ft., and mt. Erebus, of 12,400 ft. The latter is a volcano, being, it is apprehended, the only phenomenon of the kind in either of the frigid zones.

Of the two circumpolar oceans, the southerly one has excited much less interest than the northerly. In 1895-7, however, there was a marked revival of interest in Antarctic exploration. Learned societies in Germany and Great Britain were active in the matter, and in 1897 the British Admiralty agreed to man and fit out an expedition. In the same year De Gerlache planned to set out from Antwerp in the summer, and a similar expedition was proposed by Borchgrevink, a Norwegian. See POLAR EXPEDITIONS.

ANTA RES, a red star, thought by the ancients to resemble Mars. It is a double star, and the most conspicuous object in the constellation Scorpio. A. is often of use to navigators in finding longitude.

ANT-BEAR. See ANT-EATER.

ANT-CATCHER and **ANT-THRUSH**, names given to birds of tropical and sub-tropical countries, which feed chiefly upon ants. They are closely allied to the thrushes (see THRUSH), and are included with them in the family *turdidæ* or *merulidæ* of recent ornithologists. They are distinguished by a straight sub-cylindrical strong bill, hooked at the tip, slender legs, and very short tails. They form the genus *myiothra* of Illiger, now subdivided into several genera, one of which, *pitta*, contains the *brevés* of Buffon—birds of brilliant plumage, natives of the south-eastern parts of Asia and the Malayan archipelago. The true ant-catchers are mostly American, are of comparatively sober plu-

mage, live among the huge ant-hills, seldom fly, and are remarkable for their sonorous voices, the power of which in some species is extraordinary. The largest species, known as the *king of the ant-catchers* (*grallaria rex*), is about the size of a quail. Its legs are remarkably long.

ANT-EATER, *Myrmecophaga*, a genus of South American quadrupeds belonging to the natural order *edentata*. The species are few. They are perfectly toothless, their food being insects, and particularly ants, which they procure in great numbers by thrusting among them a very long cylindrical tongue, covered with a viscid saliva, and then retracting it into the mouth. The head is remarkably elongated, with a slender muzzle, and a small mouth. The tongue is doubled up in the mouth when not in use for catching prey. The ears and eyes are very small. The toes differ in number in the different species, but are united as far as the base of the claws, which are very large and strong, adapted to tearing up the habitations of ants. The great A.-E. (*M. jubata*), a native of the warm parts of South America, and called in Demerara the A.-bear, is about $4\frac{1}{2}$ ft. in length from the snout to the origin of the tail, which is more than 2 ft. long, and is covered with very long hair. The body is also covered with long hair, particularly along the neck and back. There are 4 claws on each of the fore-feet, and 5 on the hind ones. The A.-E. spends much of its time in sleep, the long snout concealed in the fur of the breast, the hind and fore claws locked together, and the bushy tail thrown over all, as if for a shade from the sun. It is very unsocial in its habits, and is regarded as a very stupid animal. It has great strength in its fore-legs and claws, and is said to hug like the bear, so as to crush an enemy to death. The female produces one young one at a birth, and carries it about for some time on her back.—Another species, the tamandua (*M. tamandua*), having the same number of claws, has a less elongated snout, comparatively short hair, and a prehensile tail, is scarcely so large as a cat, and climbs trees in quest of its insect food.—The little or two-toed A.-E. (*M. didactyla*) differs from these species not only in the number of its toes, but in other anatomical characters.—Closely allied to this genus in structure and habits is the genus *manis*, containing the PANGOLINS of Africa and India; but instead of hair, the body is covered with strong horny scales. See PANGOLIN.—The name A.-E. is given at the cape of Good Hope to the *orycteropus capensis*, the aard-vark or earth-hog of the Dutch colonists, a quadruped of about the same size with the great A.-E. of America, belonging to the same natural order, and resembling it also in its elongated muzzle and extensile tongue, which it employs in the same way, but provided with grinding teeth and flat claws adapted for burrowing. It burrows with extraordinary facility, and it is in this way that it seeks to secure its safety when assailed. It has very short hair, and little of it. The ears are moderately long. It is a nocturnal animal, and very timid.—The *echidnæ* of New Holland are sometimes called porcupine ant-eaters, from their food and their similarity to the true ant-eaters in their sharp muzzle and extensile tongue; but they differ much in some parts of their structure. See ECHIDNA. See adjoining illus., fig. 18.

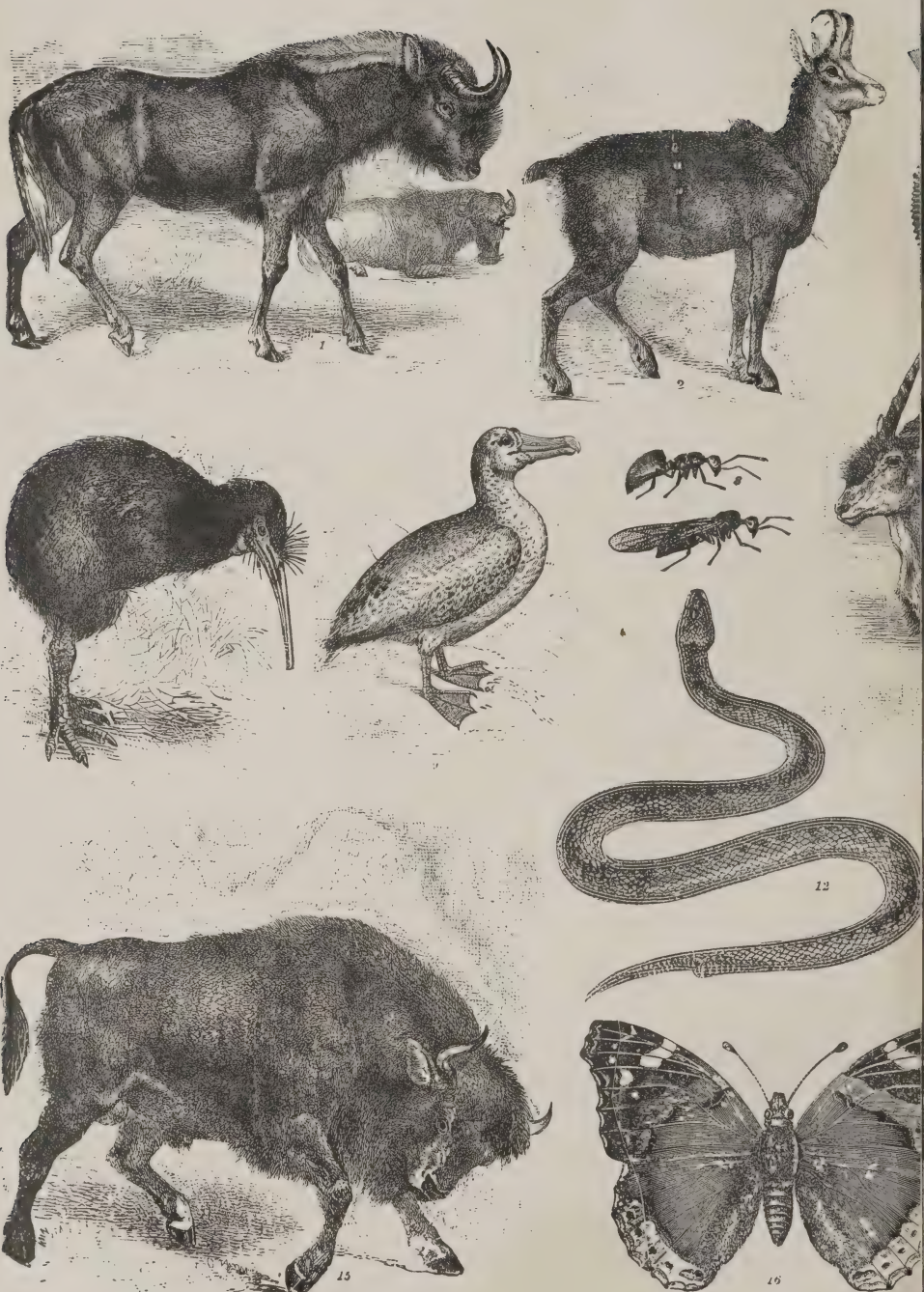
ANTECEDENT, a term in logic, grammar, and mathematics. Thus we call a proposition in logic from which another is deduced, or a general principle which serves as the base and support of some particular proposition, the A. In grammar, the A. is the word which precedes the relative—as, for example, “The *man* who dies for his country should be held in honor.” Here “man” is the A. In mathematics, we speak of the A. of a ratio—i.e., the first of two terms which compose the ratio. Thus, in the ratio of 4 to 3, 4 is the A. The word is also used in the plural in a peculiar sense. “We know very little of his *antecedents*”—i.e., of his previous character or conduct.

ANTEDILUVIAN is the word used to denote whatever existed before the flood. The A. ages are those which elapsed before the flood, and, in theological language, the A. religion means the religion of the patriarchs from Adam to Noah. In geology, the “A. period” has no reference to the deluge recorded in the Mosaic narrative, but only to the final transformation of the earth by means of water.

ANTELOPE, a co. in n. e. Nebraska; 864 sq. m.; population, '90, 10,399. Co. seat, Neligh.

ANTELOPE, *Antelope*, a genus of mammalia belonging to the order of *ruminantia* (q.v.), and to the hollow-horned section of that order—in which the horns consist of an elastic sheath surrounding a bony process of the skull, and are permanent, not annually renewed. The antelopes have the bony nucleus of the horns solid, not occupied, as in those of goats, sheep, and oxen, to a considerable extent, with cells communicating with the frontal sinuses. They are also distinguished from the allied genus of goats by having the chin beardless, and from them and sheep by the horns not being longitudinally angled or ridged. The horns of antelopes are, however, very generally annulated, or surrounded with thickened rings. The body is slender and deer-like, the feet small and elegant, the tail short and tufted, the hair generally short, and the color often lively. Some species, however, have comparatively long hair; and a few which inhabit cold mountainous regions are clothed with wool intermixed with longer and coarser hair, particularly the chamois (q.v.) of the Alps, Caucasus, etc.; the Rocky mountain goat of North America; and the chiru (q.v.) of the Himalayas. Many species have infra-orbital sinuses or *tear-pits* like deer (q.v.). The females of many species, as of deer, are destitute

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ANTELOPES, ETC.—1. Gnu. 2. Chamois. 3. Eland. 4. Ammonites amaltheus. 5. Apteryx of cayman. 11. Anchovy. 12. Adder. 13. Brown wood-ant (female). 14. Ag



5. Ammonites Jason. 7. Razor-billed auk. 8. Yellow ants. 9. Albatross. 10. Head
i. 15. Bison. 16. Admiral butterfly. 17. Gazelle. 18. Great ant-eater.

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of horns; and if they alone came under observation, it would be difficult to say to which genus they belonged. The size is very various; the gueveí or pigmy A. of Africa (*A. pygmea*) is only 8 to 9 in. high at the shoulders, whilst the largest species measure 5 or 6 feet. Almost all the species of antelopes are peaceable, timid animals, and are distinguished by their agility and fleetness. Most of them are gregarious. Some inhabit plains; others are found only in the most inaccessible mountainous regions; whilst others dwell in jungles and deep forests. North America possesses two or three species, which depart considerably, as does also the chamois of Europe, from the typical character of the genus. Europe produces only the chamois and the saiga (*A. saiga*), the *colus* of Strabo, which inhabits the southern plains of Poland and Russia. Asia has a greater number of species; but they are most numerous in Africa, and particularly in south Africa. The known species amount to more than eighty, which are arranged in sections or groups according to the peculiarities of the horns and other characters, but a satisfactory classification of them is difficult. Some naturalists make a family of *antilopeæ*, and subdivide it into genera, but they are not separated by sufficiently marked characters. The flesh of all antelopes is used as food; hence they are much objects of the chase. They furnish also great part of the subsistence of beasts of prey in Africa, where some of the species exist in such numbers that, particularly when severe drought occurs in the regions which they ordinarily inhabit, dense and multitudinous herds occasionally appear in the interior of Cape Colony, to the terrible devastation of the crops. Even the saigas of the Tatarian plains congregate in herds of many thousands in the end of autumn.

The name A. is sometimes more particularly restricted to a species also known as the common or Indian A., and as the *sasin*. It is a native of India and the eastern parts of Asia, and is a beautiful animal, about 2½ ft. high at the shoulder, with erect, diverging horns, bent in a spiral of two or three turns. The hair is uniformly short, except that, as in many other species of A., there are small tufts of bristles on the knees. It inhabits open plains, and the herd exercises great watchfulness. Its fleetness is such that greyhounds chase it in vain; and it can easily bound over an inclosure of 11 ft. in height, or over a distance of 10 or 12 yards. The flesh is held in small esteem, and the animal is less than many of its congeners an object of the chase.—The saiga is a much less graceful animal; its horns are short, and, as in many of this genus, curved first upwards and then inwards, so that the whole outline formed by them resembles that of a lyre. They are used by the Russians and Chinese for the manufacture of many articles of domestic economy; and it is chiefly for their sake and that of the skin that the saiga is hunted, the flesh having a disagreeable taste, which is ascribed to the saline and aromatic plants of the steppes. The dzeren (*A. gutturosa*), sometimes called the Chinese A., and known among the Chinese by a name which signifies the yellow goat, is an inhabitant of the arid deserts of central Asia, the flesh of which is highly esteemed, and which is therefore a chief object of the chase in these regions. It derives its specific name from a large movable goitre-like protuberance on the throat of the old males, produced by a dilatation of the larynx.—The addax, or Nubian A. (*A. addax*), which was known to the ancients, and is mentioned by Pliny, has horns very similar to those of the Indian A., but is a larger animal, less graceful, with a slight mane on the neck, a tuft of long hair on the forehead, and large broad hoofs, adapted for treading on fine and loose sands. It inhabits the deserts of central Africa, and, contrary to the usual habits of the genus, is said not to be gregarious, but to live in pairs. The chikara and some other Indian species are distinguished by two additional rudimentary horns in front of the ordinary horns, and immediately over the orbits. The chikara inhabits thick forests and jungles. Like the addax, it lives in pairs; as do also the stein-boc of south Africa, an extremely graceful species; and the kleene-boc of the same country. (*A. perpusilla*), a beautiful and active little creature, with very small horns. The kleene-boc is of a mild and gentle disposition, and extremely capable of domestication. The gazelle (q.v.) of north Africa (*A. dorcas*), one of the species known to the ancients, is very frequently domesticated; and from its gracefulness of form, its gentleness of manners, and its bright black eyes, has afforded to the Arabian poets one of their most favorite objects of comparison. The south African spring-boc (q.v.) is another very beautiful species, and is frequently domesticated by the colonists at the cape of Good Hope. Among the numerous species which that country produces may be mentioned also the blauw-boc (*A. leucophaeus*); the riet-boc (*A. arundinaceus*); and the Caffarian oryx (q.v.), (*A. oryx*), which somewhat resembles, but is quite distinct from, the oryx of the ancients (*A. leucoryx* or *A. gazella*), also called the algazel, a native of the countries on both sides of the Red sea. Still more worthy of notice among the south African species, but in some measure departing from the strict A. type, is the eland (q.v.), the largest of all the antelopes—an animal which may yet probably be found very valuable in domestication. The koodoo (q.v.) is another noble species allied to the eland. The nyl-ghau (q.v.) of India, and the gnu (q.v.) of south Africa, are also among the largest antelopes, but depart still further from the generic type, particularly the latter, so that a separate genus (*catoblepas*) has been constituted for it, having better claims to be recognized than the other genera into which it has been proposed that the antelopes should be divided. Less different from the ordinary type, but still with a marked approach to a bovine appearance, are the bubalus (q.v.) of the ancients, a native of the north of Africa, the Arabic name of which signifies wild ox, and the kaama (q.v.) or harte-beest of the

cape of Good Hope, which is nearly allied to it. The prong-horn (q.v.) and the Rocky mountain goat are the best known North American species; and both are found only in the western parts of the continent. It has been proposed to introduce the latter, as a wool-bearing animal, into the highlands of Scotland.

ANTEN'NÆ, in zoology, jointed filaments with which the heads of insects, crustacea, and myriapoda are furnished, and which are evidently very delicate organs of touch. They are therefore sometimes called feelers. The name A. is derived from *ante*, before. The A. are placed on the anterior or superior part of the head; the animals appear to feel their way with them, and to them is ascribed the bee's power of working in the dark. Some suppose that they are also organs of hearing, and by means of them it would appear that many insects, as bees and ants, have the power of communicating with one another. They possess great flexibility, but differ very much in the number of joints which they contain (amounting sometimes even to 100), in the relative length and thickness of their joints, and also in their form, being filiform or thread-like, clavate or club-shaped, feathered, etc., in endless variety.

ANTE'NOR, the wise Trojan who advised his fellow-citizens to send Helen back to her husband. His friendliness to the Greeks became complete treason when the city was taken and his house was spared by the victors. Legends differ about him; one is that he built a city on the site of Troy; others make him the founder of various cities in Italy.

ANTEQUE'RA (the *Anticaria* of the Romans), an important t. in the province of Malaga, Spain, is situated in a fertile plain, 45 m. w. of Granada. Pop. about 27,000. A., like all the other cities of south Spain, was for a while in the hands of the Moors; but in 1410 it was retaken by the regent Fernando, who is hence called *El Infante de A.* When the French took the place, during the Peninsular war, they converted a curious old mosque—a relic of Moorish sway—into a storehouse, and on their departure carried off with them the magnificent Moorish *arabry*.

ANTHE'DON, a town of ancient Greece situated at the foot of Mt. Messapion on the strait of Eubœa. The references to it in ancient writings were sufficiently exact to enable Colonel Leake, the author of *Travels in Northern Greece* to identify the site. Later, on March 5, 1889, work on the site was begun by J. C. Rolfe, of Harvard University, and resulted in the discovery of the remains of a public building, presumably an agora. Further excavations were undertaken in a small hill just outside the old city walls and architectural remains were found pointing to the existence of a shrine of Dionysos on that spot. A number of inscriptions were also found, valuable for the light they throw on the local peculiarities of the Boeotian dialect.

ANTHE'LIA (Gr. *anti*, opposite, and *helios*, the sun; Ger. *Gegensonnen*) are luminous rings, seen by an observer on a cloud or fog which lies opposite to the sun. They occur chiefly in alpine regions and in the polar seas, and are only seen when sunshine and cloud, or fog, occur at the same time. They appear in the following way: When, from an elevated position—as the mast of a ship, or the ridge of a hill—the shadow of an observer is projected by the sun on a cloud or fog, he sees the head encircled by a glory or luminous ring, diminishing in brightness as it leaves the head as a center. When the sun shines brightly, and the fog is dense, as many as four concentric rings of this nature are seen by the observer round the shadow of his head, having their common center in the point where a line from the sun through the eye of the observer meets the fog. When the phenomenon assumes this form, the rings are more or less colored—the colors of the two inner rings being generally brilliant, those of the third more faint, while those of the fourth are scarcely perceptible. This last has an angular radius of about 40°, and is very seldom seen. It bears frequently the name of the circle of Ulloa or the white rainbow. A phenomenon substantially similar to the A. occurs when, the sun being near the horizon, the observer sees an aureola surrounding the shadow of his head cast upon grass or corn moistened with dew. The occurrence of A. is generally attributed to the diffraction (q.v.) of light.

ANTHELMIN'TICS, medicines for destroying or expelling intestinal parasites; those which destroy are vermicides; those which expel, vermifuges. Among articles for the purpose are senna, pink-root, santonin, oil of turpentine, oil of fern, and pumpkin and pomegranate seeds. See ASCARIS; WORMS.

ANTHEM (Gr. *anti*, in return, *phone*, voice; a piece sung in alternate parts), a species of musical composition introduced into the service of the English church after the reformation, and appointed to be sung daily, at morning and evening service, after the third collect. The words of the A. are taken from the psalms, or other suitable parts of the scriptures, and the music is either for solo, soli, or chorus, or a mixture of all three. As a specimen of English music, it can only be heard to perfection in cathedral service. In its origin, musical construction, and use, it is similar to the motet of the Roman church, which name has been retained by the Lutheran church. See MOTETT; also ANTIPHONY.

ANTHEMIS. See CHAMOMILE.

ANTHE'MIUS, a Greek architect and mathematician, son of Stephanus, a physician, and one of five brothers, eminent as physicians, lawyers, and grammarians. It is supposed that A. anticipated Buffon in using burning glasses, and some say he knew the force of steam. He was eminent as an architect, and produced in 532, under the patronage of Justinian, the plans for the great church of St. Sophia, in Constantinople—plans which display great knowledge and great ignorance. D. about 534 A. D.

ANTHEMIUS, or **ANTHEMIUS PROCOPIUS**, a Roman emperor who reigned from 467 to 472. He was son-in-law of the emperor Marcian, and had been a favorite general of Leo, emperor of the east. His son-in-law, Ricimer, became A.'s enemy, proclaimed Olybrius emperor, and took Rome, putting A. to death.

ANTHER. See **STAMENS**.

ANTHERIDIUM, the name given by some botanists to an organ in cryptogamous plants which they suppose to be analogous in its functions to the stamen or male organ of fructification in phanerogamous plants. Antheridia are variously situated on the surface of plants or within their tissue. Sometimes they are simple cells; sometimes they are composed of a number of cells, containing a mucilaginous fluid, and peculiar small bodies called *phytozoa* (q.v.), which at a certain period exhibit active movements like those of animalcules. The antheridia finally discharge their contents through an opening; and it is supposed by some that their contact with another class of organs, to which the name pistillidium (q.v.) has been given, is essential to the production of spores, the seeds of cryptogamous plants. But these names are to be regarded as at best only provisional, and these views as far from being sufficiently established.

ANTHOLOGY (Gr. flower-collection) is the title usually given to a book consisting of an unconnected series of choice thoughts, whether in prose or verse, but generally in the latter. Of the collections of this kind made in ancient times, which consisted mostly of epigrammatic poems, the best known are the

Greek Anthologies.—The first Greek A. was compiled by Meleager of Gadara, in Syria, about 60 B.C. Besides this, there were three or four others belonging to periods considerably subsequent to the birth of Christ; but all these earlier anthologies are lost. What we now possess are two later collections, one by Constantine Cephalas in the 10th c., who borrowed largely from one of the earlier anthologies; and another by Maximus Planudes, a monk of Constantinople in the 14th c., who, by his tasteless selection from the A. of Cephalas, rather spoiled than increased the already existing store. The A. of Planudes was first issued in print at Florence in 1494 by a learned Greek, John Lascaris, and for a long time was the only one known. It went through successive editions, and received various improvements. The latest edition (with the Latin version of Grotius, a masterpiece of latinity and rapid execution) was commenced by Bosch in 1795, and finished by Lennep in 1822. Meanwhile, Claude Salmasius had discovered in the Heidelberg library (1606) the only extant manuscript of the older and richer A. of Constantine Cephalas, which he compared with that of Planudes, copying out the poems not found in the latter. During the Thirty Years' war, the Heidelberg manuscript was carried to Rome; but in 1797, after the peace of Tolentino, the French contrived to secure possession of it, and brought it to Paris. In 1816 it was returned to Heidelberg. After the important discovery of Salmasius, the work was often mentioned by the name of the Palatinate manuscript, or the Vaticano-Palatinate. Portions of it were published by Jensius, Leich, Reiske, and Klotz. The entire collection, augmented by fragments of the older poets, and by epigrams found on monuments and in other works, was edited by Brunk at Strasburg in 1776, under the title *Analecta Veterum Poëtarum Græcorum* (Selections from the Old Greek Poets), and later by Jacob, under the title of *Anthologia Græca, sive Poëtarum Græcorum Lusus ex Recensione Brunkii* (Greek A., or Fugitive Pieces of the Greek Poets, from the corrected Text of Brunk), 1794-1814, at Leipsic. Since then, it has been published variously, in whole or part. It is impossible not to admire these gems. Nowhere is there to be found a richer variety of poetic life, greater delicacy of sentiment, a more joyous serenity, a greater abundance of wise, true, humane thoughts, than sparkle in the pages of the Greek A. To the poet, it presents the most graceful images and the most exquisite conceptions; to the philosopher, maxims adorned with all the graces of style; to the historian, monumental inscriptions; to the philologist, the most varied forms of an imperishable language; to all, a charming revelation of antiquity.

Latin Anthologies.—In 1573, Scaliger published at Leyden, in imitation of the Greek A., a Latin A., under the title *Catalecta Veterum Poëtarum* (Gatherings from the Old Poets), and Pitthöus one at Paris, 1590. A larger collection was issued at Amsterdam (1759 and 1773) by Peter Burmann the younger, under the title *Anthologia Veterum Latinorum Epigrammatum et Poëmatum* (A. of Old Latin Epigrams and Poems), a more correct and better arranged edition of which was published by Riese (1869-70).

Asiatic literature is extremely rich in anthologies, which consist sometimes of extracts from the best poets, arranged according to the subject, and sometimes of "beauties" of their best poets, with biographical notices, which are either placed in chronological order, or according to the countries in which the authors lived.

1. *Arabic Anthologies*.—Abu-Temam published selections from the old Arabic songs previous to the time of Mohammed, arranged them in ten books, and named the entire collection after the first book, which consisted of war-songs, *Hamâsa*. Another famous A. is the *Divan* of the Hudhailites (an Arabic tribe), an edition of which was published by Kosegarten. Abu'l-Faraj of Ispahan (died 966) gathered together in his *Kutâb al-aghânî* (Book of Songs), all the ancient Arabic songs down to the first centuries of the califate. It was published by Kosegarten in 1840. Abu'l-Faraj accompanied the work with a minute commentary, which makes it one of the most interesting of the old Arabic literature. But the richest and most complete A. of the later Arabic poesy is *Yatimat*

al-dahr (the Pearl of the World), by Taalebi, in which the writers are arranged according to the provinces in which they lived. It has been continued and enlarged since the period of the original compiler. Besides these and similar national anthologies, collections have been made in almost every province where the Arabic culture and speech prevailed. Such, for example, are the numerous Arabico-Spanish ones, though these are but little known.

2. *Persian Anthologies*.—In the Persian literature, the best known works of this sort are *Taskarat al Shuara* (Lives of the Poets), by Daulat Shah (died 1495), the contents of which are to be found almost entire in Hammer's work on Persian *belles-lettres* (Vienna, 1818), and *Atesh Kedah* (the Fire Temple), by Haje-Lutf-Ali-Beg, who lived about 1770. Both works give biographical notices of the Persian poets: the first, in chronological order; the second, in topographical order, with specimens from their works. An A. of the best Persian poetry, arranged according to the subjects, is given in the *Medshua al Shuara* (a Collection of Poets).

3. *Tatar Anthologies*.—Of the poets who have written in the Tatar—i.e., the East Turkish or Tshagatai dialect—we possess a collection comprising 441 biographies, with specimens of their poetry: *Madshalis alnasais* (Charming Company), by Mir-Alischir (died 1500), and the *Lives of the Tatar Poets*, by Sadiki, extending down to the 17th century.

4. *Turkish Anthologies*.—The number of anthologies in the West Turkish, or, as it is generally called, the Turkish language, is very numerous. The most famous are—*Ilesht Behesht* (the Eight Paradises), by Sehi of Adrianople (died 1548); *Taskarat al Shuara* (Lives of the Poets), by Latifi (died 1582), and, under the same title, a similar work of Ashik Tshelebi (died 1571); and the great collection, *Subdat al-ashaar* (the Blossoms of Poetry), by Kassade (died 1621). The substance of these anthologies is to be found in Hammer's *History of West Turkish Poetry* (Pesth, 1836).

5. *Indian Anthologies*.—The literature of the Mohammedan population of Hindustan, which is a mere copy of Persian literature, has also several anthologies. The most important are—*Gulzari Ibrahim*, by Ali Ibrahim, containing biographical notices of 300 Hindustani poets, with specimens of their writings; the collection called *Divani Iham*, by Beni-Narayan; *Guldastai Nishdt* (Garland of Pleasure), by Manu Lal (Calcutta, 1836), and *Guldastai Nazninan*, by Kerim-ed-din (Calcutta, 1845). The substance of these works is to be found in Garcin de Tassy's *Histoire de la Littérature Hindui et Hindustani* (Paris, 1839-1847), which, under the title of *Tabakati Shuarai Hindi*, was translated into Hindustani by Kerim-ed-din (Delhi, 1848). In the pure Hindi, we have a rich collection of songs, the *Rago Sagar*, by Krishnananda (Calcutta, 1845).

6. *Sanscrit Anthologies*.—The Sanscrit literature is not so rich in anthologies as the other oriental literatures. If we do not consider the Vedic hymns, and the collections of poems which bear the general title *Sataka* (a Century), anthological in the proper sense, there is only one work of this kind known—viz., the *Paddhati*, by Sarngadhara, towards the close of the 14th c., in which are gathered together 6000 detached strophes of the most famous epic, lyric, and dramatic poets of India, arranged under certain heads.

7. *Chinese Anthologies*.—From the earliest ages, the Chinese had the custom of sending, along with the yearly tribute to the emperor, copies of such songs as had acquired popularity. Confucius selected from a great number of these 311 of the most beautiful. These are preserved under the name *Shi-king* (Book of Songs), one of the canonical books of the Chinese. This is the oldest A. in the world. A Latin version, by Lacharme, was published at Stuttgart, 1830; a German one, by Rückert, at Altona, 1833. Besides this, there is *Tchao-ming-wen-siouen*, a collection of the finest poems of the time of the Liang dynasty (502-556 A.D.), and also *Thang-shi*, poems of the time of the Thang dynasty (618-914 A.D.).

ANTHON, CHARLES, LL.D., a well-known editor of classics, was b. in the city of New York in 1797. At the age of 14, he entered Columbia college, where he pursued his studies with ardor and success for 4 years. Having been originally intended for the law, he now passed through a preliminary practical instruction in his brother's office, and in 1819 was admitted to the bar of the supreme court of the state of New York. His time, however, was chiefly devoted to classical literature, for which he soon began to acquire a high reputation; and in 1820, when only 23 years of age, he was appointed adjunct-professor of languages in Columbia college, which office he held for 15 years. He now commenced that series of classical publications which has done so much to make available for popular purposes the erudite researches of European scholars. His first work was a new edition of Lempriere's *Classical Dictionary*, which was almost immediately reissued in England. In 1830 appeared his larger edition of Horace, quite a novelty in its way, on account of the superabundant English notes which accompanied the text. In 1833, he issued a smaller edition, for the use of schools and colleges. Virgil, Cæsar, and other ancient writers have been illustrated in the same attractive manner. A.'s editions of the classics have acquired an extensive popularity; but scholars are disposed to regard them with a kind of learned aversion, both because of the temptations they present to the school-boy to overlook the difficulties of a knotty passage, and of the superfluous and often unimportant matter which is dignified with the title of "commentary" or "notes." It cannot be doubted, however, that these works have given a healthy stimulus to the rudimentary study of the ancient authors. In 1831, A. received

the degree of LL.D. from his Alma Mater. In 1835, he succeeded Prof. Moore in the chair of languages. A. likewise published large works on ancient geography, Greek and Roman antiquities, mythology, literature, etc. He d. July 29, 1867.

ANTHONY, ADRIAN VARICK STOUT, b. New York, 1835; engraver. His professional life has been spent chiefly in New York and Boston in the employ of the leading publishing houses. Among the books the illustrations of which he engraved are *Snow Bound*, *The Skeleton in Armor*, and *The Lady of the Lake*.

ANTHONY, HENRY B., an American statesman, b. R. I., 1815; a graduate of Brown university, 1833; became editor of the *Providence Journal*, 1838, which position he held more than 20 years; in 1849 was elected governor of Rhode Island; re-elected in 1850; and declined further nomination for the office. He was elected U. S. senator in 1858; re-elected in 1864, '70, '76; was chosen president *pro tempore* of the senate in 1869, and again in 1871. He d. 1884.

ANTHONY, SUSAN BROWNELL, b. Mass., 1820; one of the principal leaders of the "woman's rights" movement; daughter of a Quaker. She was a teacher in New York for 15 years, and was long distinguished for zeal and eloquence in the anti-slavery cause. She is still an eloquent advocate of total abstinence and woman-suffrage.

ANTHONY, SAINT. See **ANTONY, ST.**

ANTHOXANTHUM. See **VERNAL GRASS.**

ANTHRACENE, or **PARANAPHTHALINE** (C_8H_6)₂ (CH)₂, a solid hydrocarbon accompanying naphthalene in the last stages of the distillation of coal tar. It has acquired great importance as the material from which alizarine is manufactured. A ton of A. can be obtained by the distillation of about 2000 tons of coal, besides the A. contained in the pitch. Pure A. occurs in bluish white foliated crystals, having a violet fluorescence. A. melts at 213° C. and boils above 360° C.; it sublimes more or less readily at temperatures between these two. It is soluble in boiling alcohol, and in light naphthas, from which it crystallizes out on cooling. Heated slightly with fuming sulphuric acid, it dissolves gradually, giving a greenish solution of sulphanthracene acid. A. subjected to oxidation yields anthraquinone (C_8H_6)₂(CO)₂. A. has been made artificially from toluole and from benzole. See **ALIZARINE**.

ANTHRACITE (Gr. *anthrax*, a coal), a mineral substance of the nature of coal, but consisting of carbon with a minimum amount of hydrogen. It is of a black color, conchoidal fracture, and imperfectly metallic lustre (hence called *glance-coal*). It burns slowly, and without flame, and hence is sometimes called *blind-coal*. Its vegetable origin cannot be doubted. Where strata of common coal have been broken through by trap dikes, the coal next the trap is found to be A., with a gradual transition into the ordinary state; hence geologists look upon A. as natural coke (q.v.), formed by heat or other process from ordinary coal. A. is used as fuel like coke. It is applied in many places to the burning of lime and bricks, the reduction of iron, etc. It occurs extensively in Ireland, and in some of the coal-fields of England, Scotland, and the continent of Europe; but on the largest scale in the United States.

The anthracite, or hard coal, mined in America comes chiefly from about 470 sq.m. in eastern Pennsylvania, where three parallel deposits occur in the counties of Dauphin, Schuylkill, Carbon, Northumberland, Columbia, and Luzerne. A. was found very early in the valley of Wyoming, and was used by smiths as early as 1768-69. In 1776, A. from near Wilkesbarre was floated down the Susquehanna to Carlisle, and was used in the government arsenal. A. was discovered at the Lehigh end of the Schuylkill coal-field by Philip Ginter, a hunter, in 1791, and a quarry was opened the same year. In 1803, 100 tons were brought from Summit hill to Philadelphia, and were sold to the city government for use in the pumping works, but the engineers did not know how to burn it, and it was broken up to gravel the walks in the yards. In 1814, two ark-loads were sold at the falls of the Schuylkill at \$21 per ton. A morning was wasted in futile attempts to burn this coal, and at noon the workmen and their employer, discouraged at their ill-luck, shut up the furnace and went to dinner. On their return they were astonished to find a roaring fire, the furnace doors red-hot, and the furnace itself in danger of melting. From that day dates the successful use of A. in America.

A. is the purest form of natural carbon, except the diamond. The carbon varies from 95 per cent in specimens picked from the best veins, to 80 or 85 per cent. Coal containing less than 80 per cent of carbon is not classed as anthracite. The volatile matter present is water, oxygen, hydrogen, and nitrogen; the ash contains oxide of iron, iron pyrites, silica, alumina, lime, etc. Pennsylvania anthracites have usually 86 to 94 per cent of carbon, 1½ to 7 per cent of volatile matter, and 1½ to 7 per cent of ash; the density varies from 1.4 to 1.63. A. was derived from bituminous coal by heat acting under great pressure, and probably caused by pressure in the geological changes which threw the anthracite regions, as in eastern Pennsylvania, into great mountain waves. The heat drove off all volatile matters which it would develop from the bituminous coal, and left the more stable material behind as a natural coke, differing from artificial coke only in its superior density. The loss of vegetable matter by decomposition in the formation of bituminous coal is estimated at about three fifths of the material,

and in the production of A. at about three fourths; the added compression leaves the resulting bulk about one fifth or one eighth the original mass. It follows, then, that to produce a vein of A. 30 ft. thick, 240 ft. of vegetable matter must have existed. The coal deposits, as found in the A. formation near Pottsville in the Schuylkill valley, include 15 groups, with 30 beds or veins more than 2 ft. thick, and 20 seams less than 2 ft. The thickest, or mammoth vein, is a single bed from 20 to 70 ft. thick, in some places divided into 3 layers by seams of slate. About four fifths of the present production of A. comes from this vein. The aggregate thickness of the coal veins at this point is 113 ft., of which 80 ft. may be profitably mined. See COAL. The distribution of anthracite coal to 1895 is shown in the following table:

SHIPMENTS OF PENNSYLVANIA ANTHRACITE COAL SINCE 1820.

YEARS.	SCHUYLKILL REGION.		LEHIGH REGION.		WYOMING REGION.		Total.
	Long tons.	Per ct.	Long tons.	Per ct.	Long tons.	Per ct.	
From 1820 to 1859, inclusive...	44,049,622	52.54	17,755,009	21.18	22,031,210	26.28	83,835,841
From 1860 to 1869, inclusive...	44,769,022	41.80	20,035,073	18.71	42,288,823	39.49	107,092,918
From 1870 to 1879, inclusive...	68,237,040	34.87	35,683,152	18.23	91,794,184	46.90	195,714,376
From 1880 to 1889, inclusive...	96,428,369	30.56	55,016,850	17.44	164,077,794	52.00	315,523,013
From 1890 to 1895, inclusive...	75,030,569	30.12	39,893,353	15.28	134,266,019	54.60	249,189,896

DISTRIBUTION OF ANTHRACITE COAL FOR 1894 AND 1895.

R. R. COMPANY.	Shipments 1894.	Shipments 1895.
Philadelphia & Reading	8,286,518	9,905,059
Lehigh Valley	6,423,914	7,360,454
New Jersey Central.	4,846,909	5,388,194
Delaware, Lackawanna & Western.....	5,997,585	6,129,200
Delaware & Hudson.....	3,994,251	4,347,843
Pennsylvania R. R.	4,726,875	5,025,645
Pennsylvania Coal Co.	1,705,317	1,746,832
Erie R. R.	1,668,065	1,820,038
New York, Ontario & Western.....	1,370,049	1,424,407
New York, Susquehanna & Western.....	740,903	1,492,244
Coxs Bros. & Co.	1,630,813	1,905,784
Totals.....	41,391,199	46,545,760

See GEOLOGY.

ANTHRAX (Greek). A name now generally given to a widely distributed and very destructive disease which takes the form of malignant boils, or carbuncles. It is most common among cattle and sheep, although it is also very destructive to horses and camels, while rabbits, hares and rats are readily affected. Besides its practical importance, it has a special theoretical interest, because it was the first infectious disease proved to be due to the presence of microscopic vegetable organisms, and because it has been more fully studied than any other analogous disease. See GERM THEORY OF DISEASE; BACTERIUM.

ANTHROPOGRAPHY. See ANTHROPOMETRY.

ANTHROPOLATRY (Gr.), a term signifying, according to its derivation, the worship of man, and always employed in reproach. Thus, the early Christians accused the heathens of A., because, in their mythology, men were represented as exalted among the gods, although an *apotheosis* (q.v.) was in these cases alleged by their worshippers; and the heathens retorted the charge because of the worship of Christ; the reply to which was the assertion of his divinity. But the term is chiefly known in ecclesiastical history in connection with the employment of it by the Apollinarians (q.v.) against the orthodox Christians of the 4th and 5th c., with reference to the doctrine of the perfect human nature of Christ. See APOLLINARIS.

ANTHROPOLOGY is the "science of man," or natural history of mankind; in the general classification of knowledge, the highest section of zoology, or the science of animals, which is itself the highest section of biology, or the science of living beings. To A. contribute the sciences of anatomy, physiology, ethics, sociology, prehistoric archæology; although each of these branches of investigation pursues its own subject, having no further contact with A. than when its research concerns man. It is the office of A. to collect and set forth, as completely as possible, the synopsis of man's physical

and mental nature, and the theory of his course of life and action from his first appearance on the planet. Looking at man's place in nature, we see that the higher apes come nearest to him in bodily formation, and here it is the office of zoology to point out resemblances and differences, and to ascertain relations. "At this point," says prof. Owen, in a paper on the bony structure of apes, "every deviation from the human structure indicates with precision its real peculiarities, and we then possess the true means of appreciating those modifications by which a material organism is especially adapted to become the seat and instrument of a rational and responsible soul." Huxley, in comparing man with other orders of mammalia, decides—"There would remain then but one order for comparison, that of the apes, and the question for discussion would narrow itself to this: Is man so different from any of these apes that he must form an order by himself? Or does he differ less from them than they differ from one another, and hence must he take his place in the same order with them?" Here the reference plainly limits itself to the human body. Huxley compares man with the gorilla, which is on the whole the most man-like of all the apes. The gorilla has a smaller brain-case, larger trunk, shorter legs, and longer arms than man. The differences in the skulls are remarkably apparent. In the gorilla the face, formed largely by the massive jaw-bones, predominates over the brain-case; in man these proportions are reversed. In man the skull is set evenly on the spine, the spinal cord being just behind the center of the base of the skull; but in the gorilla, which usually goes on all-fours, the skull is inclined forward and the spinal cord is further back. In man the surface of the skull is nearly smooth, the ridges of the brow having but slight projection, while in the gorilla these ridges are enormous. The capacity of the largest gorilla skull yet measured was but 34½ cubic in.; that of the smallest human cranium is almost 63 in. The gorilla's large facial bones and great projection of jaws give its face a brutal expression, and its teeth differ from man's in size and in the number of fangs. The gorilla's arm is one sixth longer than its spine; man's is one fifth shorter. The legs differ not so much, but the hands and feet of the gorilla are longer than in man. The vertebral column and the narrow pelvis differ from those of man; the thumb is much shorter and the hand clumsier than man's. But a radical difference is in the amount of brain, that of the gorilla being 20 oz., while in man it is seldom less than 32. Prof. Huxley, restoring in principle the classification of Linnaeus, would include man in the order of *primates*, and divide that order into seven families: 1, *anthropini*, consisting of man only; 2, *catarrhini*, or old world apes; 3, *platyrrhini*, including all new world apes except the marmoset; 4, *arctopithecini*, or marmosets; 5, *lemurini*, or lemurs; 6, *cheiromyini*, or bats; and 7, *galeopithecini*, or flying lemurs.

In fixing man's place in nature on physiological grounds, much greater difficulty is met. There is here an enormous gulf between the most brute-like of men and the most man-like of apes; a chasm not to be accounted for by minor structural differences. The bold investigations and speculations of science have not yet been able to eradicate the opinion, deeply rooted in modern as in ancient thought, that only a distinctively human element can account for the wide severance between man and the highest animal below him. Mere mechanical differences do not explain the divergence. An ape with a man's hand and voice would still have to rise through a long structural growth to be indeed a man. The greater amount of brain in man comes nearer to explain the difference; but even that fails. In some of the senses man is quite inferior; he cannot equal the eagle in sight, the dog in scent, nor one of a dozen animals in hearing; though in the senses of tasting and feeling he may be superior to any of them. We must conclude that it is by superiority in quality, as well as in quantity, of brain, and, because of that superiority, by the possession of a highly organized language, that man has the power of co-ordinating the impressions of his senses, which enables him to understand the world in which he lives, and, by understanding, to use, resist, and rule it. This power of using what his senses reveal to him is clearly expressed by man in his language. He shares with beasts and birds the power to express feelings by emotional cries; the parrot approaches him in utterance; and by association of ideas, some of the lower animals understand to a certain extent what he says. But the abstract power of using words, in themselves meaningless, as symbols by which to convey complex intellectual processes—in which mental conceptions are suggested, compounded, combined, and even analyzed, and new ones created—is a faculty scarcely to be traced in any other animal than man.

That this power is a function of the brain has been fully proved in diseases of that organ, such as aphasia. This may stand among the best evidences that the brain is the principal, if not the sole, organ of mind. But animals of lower grade share with man in varying degree in many of the high attributes. Sudden terror affects man and beast alike; in both the muscles tremble, the breast palpitates, the sphincters are relaxed, and the hair stands up. Memory in some of its ranges is very strong in some animals, especially in elephants and dogs. Reasoning power is shown when the monkey breaks an egg softly and picks away the shell cautiously so as to preserve the entire contents. Monkeys also use mechanical defenses, throwing sticks and stones, and nuts from trees, at their enemies; and the wonderful mechanical instinct shown in nest-building by birds and insects must not be forgotten, yet man rises above all this, and remains the only creature who is not subject to nature, but has knowledge and power to control and regulate his actions, and to keep in harmony with nature, not by a change of body but by

an advance of mind. The lower instincts which tend mainly to self-preservation are weaker in man than in many other animals, while philosophy, seeking knowledge for its own sake; morality, manifested in the sense of truth, the right, and virtue; and religion, the belief in, and communion with, some spiritual being above man, are human characteristics, of which the lower animals show at most but the faintest traces. Yet the tracing of physical and even intellectual continuity between the lower animals and man need not lead the anthropologist to lower the rank of man in the scale of nature.

Modern materialists are content to regard the intellectual functions of the brain and the nervous system as all there is to be considered in a psychological comparison of man with lower animals. They hold that man is a machine—wonderfully complex, to be sure, yet only a machine, provided with energy by force from without—which mechanically performs the acts for which it was constructed, such as eating, moving, feeling, and thinking. But their views are strongly opposed by those who combine spiritualism and materialism in the doctrine of a composite nature in man; animal as to the body, and in some degree as to the mind, or, as some term it, the soul; spiritual as to the soul or, as some prefer to call it, the spirit. Dr. Prichard sustains the time-honored doctrine which refers the mental faculties to the operation of the soul. Mivart, the comparative anatomist, says: "Man, according to the old scholastic definition, is a 'rational animal,' and his animality is distinct in nature from his rationality, though inseparably joined during life in one common personality. Man's animal body must have had a different source from that of the spiritual soul which informs it, owing to the distinctness of the two orders to which those two existences severally belong." In this view not life only but thought also is a function of the animal system, in which man excels all other animals as to the perfection of organization; but beyond this, man embodies an immaterial and distinctively spiritual principle which no lower creature possesses, and which makes the resemblance of the ape to him merely superficial. It is not our business to decide upon these conflicting doctrines, each of which has the support of many names high in science and philosophy.

Concerning the origin of man, opinion is divided between the two great schools of biology—that of creation and that of evolution. The old doctrine of the contemporaneous appearance on earth of all animals was long ago set aside by the researches of geology, and it is admitted that the animal kingdom, past and present, includes a vast series of successive forms, appearing and disappearing in the lapse of ages. Our subject requires us to ascertain what formative relation subsists among these species and genera—the last link of the argument reaching to the relation between man and the lower creatures preceding him in time. Agassiz admits that there is a manifest progress in the succession of beings, an increasing similarity between the living fauna, and among vertebrates especially an increasing resemblance to man. But among the causes of this succession of types he does not include parental descent: "the link by which they are connected is of a higher and immaterial nature, and their connection is to be sought in the view of the Creator himself," whose ultimate aim, to which all creation and progress was made auxiliary, was to introduce man as the crown of his work. This is the "creationist view." But the evolutionist maintains that successive species of animals, though never so diverse in appearance, are really connected by parental descent, having become modified in the course of successive generations. Lamarck says "man is co-descendant with other species of some ancient, lower, and extinct form." Darwin's conclusion that man is the descendant from some animal of the *simian* (monkey) stock is well known, though his qualification that "we must not fall into the error of supposing that the early progenitor of the whole *simian* stock, including man, was identical with, or even closely resembled, any existing ape or monkey," is not so widely recognized. The problem of the origin of man cannot be properly discussed apart from the full problem of the origin of species (see SPECIES). The likeness between man and other animals which both schools try to account for; the explanation of any interval with apparent want of intermediate forms, which seem to the creationists so absolutely a separation between species; the evidence of useless rudimentary organs, such as in man the external shell of the ear, and the muscles which enable some men to move their ears (which rudimentary parts the evolutionists hold to be explainable only as relics of an earlier specific condition)—these, which are the chief points in the argument on the origin of man, belong to general biology. The theory of evolution tends towards the supposition of ordinary causes (such as natural selection) producing modification in species; the theory of creation has recourse to acts of supernatural intervention. A middle course is suggested by Mivart: that man's body belongs to natural evolution; his soul to supernatural creation. But this compromise, though it seems to be gaining adherents, thus far fails to satisfy either school. There is no question, however, that evolution, as a distinct theory, apart from all supposed connection with materialism, is securing the assent of scientists. We wait to see whether the discovery of intermediate forms will go on till it produce a disbelief in any real separation between neighboring species, and especially whether geology can furnish traces of the hypothetical animal which was man's nearest ancestor, while not yet man.

Coming to look into the antiquity of man, we remember that it is only a few years since English-speaking people very generally accepted the chronology of Archbishop Usher, and agreed, without investigation and almost without question, that the earth

and all that it contains was created 4004 years before the advent of Christ. That and all other known systems of chronology, as fixing the date of the earth's origin, have been entirely overthrown by geological and astronomical facts; and even as fixing the date of man's origin they have been with great force called in question, and by many investigators positively rejected. These last assert that it is useless to speculate as to years or even ages in order to fix dates. The asserted discovery of human bones and articles manufactured by men in strata holding the remains of the fossil species of elephant, rhinoceros, etc., would, unless disproved, inevitably lead to the inference that man existed during the life-period of those animals. Further evidence has been found that seems to take man back to the quaternary or drift period; and such evidences are generally accepted by geologists as carrying back the existence of man at least into the period of the post-glacial drift, in what is now called the quaternary period, indicating an antiquity at the very least of tens of thousands of years. The 20 centuries of English and French history are counted but as a mere fraction of the time that has elapsed since the stone implements of prehistoric tribes were buried under beds of gravel and sand by the rivers now known as the Thames and the Somme. If we consider the geological formation of such valleys as those in which these rivers flow, and estimate from present data the time required for the rivers to dig such valleys, it follows that the drift beds and the men whose works they inclose must have had existence at a period so remote that any comparison with the received chronology of years and centuries is impossible, and the attempt to fix dates would be absurd. For the present we must be content to begin with "Once on a time." Still, certain inferences have been drawn that may be noted. A boring of 90 ft. in the Nile valley, reached pottery and burnt brick, showing that man in a fairly civilized state dwelt there so long ago that, at the rate of deposit by the river, it must have been several thousands of years. The lake dwellings of Switzerland—huts in number amounting to villages, built on piles in the water at some distance from the shore for safety against attack—indicate very remote antiquity; and the same may be said of the Danish remains of fire-places, or kitchen refuse heaps. Extant chronicles must also be noted. The oldest written records are hieroglyphic inscriptions, and the oldest can be hardly less, and may probably be much more, than 3000 years earlier than the Christian era. It is certain that more than 4000 years ago the Egyptian nation occupied a high plane in industrial, social, and political culture. The inscribed bricks of temples in Chaldea are of a date earlier than 2000 B.C., and Chinese civilization can be certainly traced back to a period anterior to 2000 B.C. Until recently it was the common opinion that the early state of society was one of comparatively high culture; but now the opinion is paramount that whatever may have been the earliest state, all recorded human civilization has been gradually developed from a state of barbarism. This hypothesis makes it necessary, it is claimed, to add 4000 to 5000 years to the earliest dates for Egyptian, Babylonian, and Chinese civilizations as generally traced. It is claimed, also, that much further time should be allowed during which the knowledge, arts, and institutions of these countries attained the level at which we fix their earliest dates. This view is thought to be strongly corroborated by philology. Hebrew and Arabic are closely related languages, neither of them being the parent of the other, but both the offspring of some earlier tongue. Therefore, when the Hebrew records have taken back to the most ancient admissible date the existence of the Hebrew language, this date must have been long preceded by that of the extinct parent language of the whole Semitic family; while this again may be considered to be the descendant of languages slowly shaping themselves through ages into this peculiar type. The evidence of the Aryan, or Indo-European, family of tongues is advanced as still more striking. The Hindoos, Medes, Persians, Greeks, Romans, Germans, Kelts, and Slavs make their appearance at dates more or less remote, as nations separate in language as in history. Nevertheless, it is now generally believed that in some high antiquity, before these nations were divided from the parent stock and distributed over Asia and Europe by the Aryan dispersion, a single barbaric people stood as physical and political representative of the nascent Aryan race, speaking an Aryan language, now perhaps extinct, from which, by a series of modifications not to be estimated as possible in any brief period, there arose languages which have been mutually unintelligible since the dawn of history, and between which only an age of advanced philology could trace the fundamental relationship. Combining these considerations, we find the basis claimed for the hypothesis that the furthest date to which writing, or rock inscriptions, or language, extends, is to be regarded as but the earliest distinctly visible point of the historic period, beyond which stretches back the unknown series of prehistoric ages. Advocates of the old chronology, while calling attention to the fact that many of these assertions are as yet hypotheses awaiting proof—and that some of the most important of them can be substantiated only on an ascertainment that present rates of geological formation and linguistic construction exactly decide the rate of progress under perhaps extremely diverse conditions in an unknown past—are yet not unready to concede that the old chronology must be regarded as uncertain in its starting-point, as well as indefinite in its terms, and as leaving gaps which are to be filled by an increasing knowledge. They demand, however, that these deficiencies be left unfilled until the undeniable facts are in hand for that purpose; and that till then, no merely probable hypothesis be accepted as of final authority. It should be observed that the Bible is not, as is commonly supposed,

responsible for Archbishop Usher's chronology. That system is, of many possible systems equally accordant with the Bible, the one which has gained the widest acceptance.

In classifying the races of mankind, a number of systems have prevailed. The color of the skin is the first striking difference in showing race, and this distinction is found in ancient Egyptian portraits, and writers, ancient and modern, speak of white, yellow, and black races. The structure and arrangement of the hair is a better indication of race than the tint of the skin. Stature is an uncertain guide, for there are short and tall men in all races; still, an average rate of stature may indicate descent, and it is noteworthy that people of Keltic origin in Great Britain are shorter than those of Teutonic descent (see ANTHROPOMETRY). The conformation of the skull has been used also, and careful measurements of form and capacity have been made; but shapes of the skull vary so greatly even in the same tribe, as to render this method of determining race practically worthless. The features, or general contour of the face, being at once apparent to the eye, are much used by scientific observers to determine race. Some of the most notable features, in contrast with European types, are seen in the oblique eyes of the Chinese, the pointed Arab chin, the Kirghis snub nose, the fleshy lips of the negro, and the broad ears of the Kalmuk. In Europe and America the Hebrews are distinguished by their peculiar features, and some physiognomists will undertake to select almost any nationality by mere examination of faces. The adaptation of a people to its climate forms a definite race-character, and typical instances of the relation of race-constitutions to particular diseases are seen in the liability of Europeans in the West Indies to yellow fever, from which, as has been thought, though scarcely proved, negroes are commonly exempt. Even the vermin infecting different races of men have been classified. Physical capabilities of races differ widely; but as the same is true of individuals of all races, such differences can hardly be used for race-classification. Two strongly marked mental contrasts are found in the shy and impassive Malay and the sociable and demonstrative Papuan. Classifications by race have been numerous, but all more or less imperfect, and some worthless. Blumenbach's "five races" is a widely known classification: Caucasian, Mongolian, Ethiopian, American, and Malay. Pickering made 11 races, Bory de St. Vincent 15, and Desmoulins 16; but no modern naturalist would accept any of these classifications. On the whole, probably Huxley's scheme more nearly than any other approaches to a classification that may be accepted in definition of the principal varieties of mankind, regarded from a zoological point of view. He makes four types: 1. The *Australoid*; chocolate-brown skin, dark brown or black eyes, black hair, narrow skull, brow-ridge strikingly developed, projecting jaw, coarse lips, and broad nose. This type is best represented by native Australians, and the coolies of southern India. 2. The *Negroid*; chiefly the negroes of Africa; with dark brown to brown-black skin, eyes of like hue, hair usually black, crisp, and woolly; skull narrow, but orbital ridges not prominent, jaws projecting, nasal bones depressed, and thick lips. 3. The *Mongoloid*; prevailing over the area east from Lapland to Siam; of short build, yellowish-brown skin, black and straight hair, black eyes, broad skull, brow-ridges usually not prominent, small flat nose, or eyes set obliquely. 4. The *Xanthochroi*, or fair whites; skin almost colorless, blue or gray eyes, hair from straw color to chestnut, and skull large though variable in size. To these four general divisions he adds *Melanochroi*; much like the fair whites, but of smaller stature and darker shade of hair, eyes, and skin—such as the Kelts, the people of southern Europe, the Greeks and Arabs.

On the origin of races there has long been, and still continues, an earnest discussion. On one hand, it is claimed by monogenists that all men descended from a single pair; on the other, it is contended by polygenists that there were many primary species of separate origin. The monogenists rest upon the Bible, and point to Adam and Eve; the polygenists, while arguing from science, with equal confidence, show biblical passages from which they infer the existence of contemporaneous non-Adamite races; and even political science was called in to support the idea of more than one original race, when the institution of slavery in the United States was defended on the assumption that the negroes were a different race, inferior to the whites or the Indians. We do not enter into even a statement of the many variations of the human type, but observe that the general tendency of the evolution theory is against constituting separate species where the differences are moderate enough to be accounted as due to variations from a single type; while it is not inconsistent with evolution to claim that several distinct simious species may have culminated in several races of men. Still the drift of the evolution theory is towards unity of origin. Darwin says: "When naturalists observe a close agreement in numerous small habits, tastes, and dispositions, between two or more domestic races, or between nearly allied natural forms, they use the fact as an argument that all are descended from a common progenitor, who was thus endowed; and consequently that all should be classed under the same species. The same argument may be applied with much force to the races of man." The experience of the last few years countenances Mr. Darwin's prophecy, that before long the dispute between those who hold that all men came from one pair and those who hold to diverse originals, will die a silent and unnoticed death.

See Lubbock, *Origin of Civilization* (1870); Tylor, *Primitive Culture* (1871), and *Anthropology* (1881); Waitz and Gerland, *Anthropologie der Naturvölker*, 6 vols. (1859-71); and the *Dictionnaire des Sciences Anthropologiques* (1882 foll.).

ANTHROPOMETRY (the measurement of man), of late years much attended to by anthropologists, foremost among whom is Dr. A. Weisbach, chief physician to the Austro-Hungarian hospital in Constantinople. His measurements refer to 19 different peoples and more than 200 individuals from all parts of the earth, and take cognizance of the pulse, the length of the body, the circumference of the head, the height and length of the nose, as well as the comparison of the length of the arm and bones with each other. Thus, for example, the number of pulse-beats per minute varies within wide limits; the Congo negroes, 62, and, next to them, the Hottentots and Roumanians, 64, have the slowest pulses. Then follow the Zingani, 69; Magyars and Kafirs, 70; north Slavs, 72; Siamese, 74; Sundanese and Sandwich islanders, 78; Jews, Javanese, and Bugis, 77; Amboinese and Japanese, 78; and lastly, the Chinese, 79. The quickest pulses belong to the Tagals, 80; the Madurese and Nikobars, 84. As to height, the smallest among the peoples measured are the Hottentots, 1286 millimeters; this is far below any other people, as the next, the Tagals, are 1562. Then follow the Japanese, 1569; the Amboinese, 1594; Jews, 1599; Zingani, 1609; Australians, 1617; Siamese, 1622; Madurese, 1628; south Chinese, 1630; Nikobars, 1631; Roumanians, 1643; Sundanese; 1646; Javanese, 1657; Magyars, 1658; Bugis, 1661; north Slavs, 1674; north Chinese, 1675; and Congo negroes, 1676. The longest measurements, however, are found among the Sandwich islanders and Kanaks, 1700 millimeters; Kafirs, 1753; and the Maoris of New Zealand, 1757. To compare these with European peoples as to stature, we find that that of the English and Irish is 1690 millimeters; the Scotch, 1708; Swedes, 1700; Norwegians, 1728; Danes, 1685; Germans, 1680; French, 1667; Italians, 1668; and, lastly, Spaniards and Portuguese, 1658. The greatest circumference of the head is found among the Patagonians, 614 millimeters, and Maoris, 600. Following these are the Kafir, 575; Nikobars, 567; north Slavs, 554; Congo negroes, south Chinese, and Kanaks, 553; Tagals, Sundanese, and Roumanians, 552; Japanese, 550; Bugis and Jews, 545; Amboinese, 544; Javanese, 542; Hottentots, 540; and, lastly, the Zingani and Siamese, 529. Stature and circumference of head generally stand to each other in opposite relations; although there are exceptions, as in the case of the Siamese with small stature and small head, and the Patagonians with great height and large heads. The breadth of the root of the nose is found greatest among the Patagonians, 41 millimeters; less among the Congo negroes, 36; Australians, Maoris, and south Chinese, 35; Sundanese, Amboinese, Bugis, Nikobars, Tagals, and Kanaks, 34; north Chinese, Kafirs, north Slavs, Roumanians, Magyars, and Zingani, 33; Jews, Japanese, Siamese, Javanese, and Hottentots, 32. The Jews and Patagonians excel in length of nose, 71 millimeters. Following these are the Kanaks, 54; Roumanians, 53; north Slavs and Maoris, 52; Tagals, 51; Japanese and north Chinese, 50; Siamese, Magyars, Zingani, Madurese, 49; Amboinese, 48; Nikobars, 47; Sundanese, Javanese, south Chinese, Kafirs, 46; Hottentots, 44; Congo negroes, 42; Bugis, 41; and Australians, 30. The breadth of the nostrils gives quite another arrangement. Here we find the Australians excel, 52 millimeters; then come Congo negroes, 48; Kafirs and Patagonians, 44; Tagals, 42; Nikobars, 41; Hottentots and Sundanese, 40; Malay races, 39; south Chinese, 37; north Chinese, 36; Japanese, north Slavs, Roumanians, Zingani, 35; Magyars and Jews, 34. With regard to the bust, it is found that the North American Indians and the Polynesians excel all others in size. Next to them come the north, middle, and east Europeans; after them come the west Europeans, negroes, and after them the south Europeans, who are followed by the east Asiatics and Malays. Among European peoples, in respect of race, we find the narrowest chests among the Semites, followed in order by Romany, Kelts, Fins, Zingari, Germans, and Slavs. Since 1882 anthropometry has been used in the administration of the criminal law, in accordance with the system of Alphonse Bertillon of Paris, which is intended to afford a positive means of identifying any person who has been once examined according to anthropometric rules. Measurements for this purpose include height, length and width of head, length of the middle and little fingers, forearm, foot, and length and breadth of the region of the ear. All marks and scars, the color of the hair and eyes, and the phalanges and articulations of the fingers are noted. In the measurement of over 130,000 persons by the Paris police, it was found that in no two cases did the measurements agree. In June, 1891, Mr. Francis Galton, in a paper in *Nature*, showed that one of the surest anthropometric tests was derived from impressions of the inked forefinger. See *Anthropométrie Militaire* in *Journal de la Société de Statistique de Paris* (Nov., 1896).

ANTHROPOMORPHISM (from the Gr. *anthrōpos*, man, and *morphē*, a form), the application, in a figurative way, to God, of terms which properly relate to human beings. Thus, in the holy Scriptures, we read of the eye, the ear, the arm, the hand of God, and of his remembering, forgetting, etc. This A. appears to arise of necessity from our incapacity of forming conceptions of things spiritual, or finding any terms in which to express them, except by analogies derived from things cognizable by our senses, so that even the language of adoration is borrowed from the familiar things of this world. It must be evident, however, that A., employed in an ungarded manner, or too grossly understood, might lead to most serious error; and a tendency has manifested itself at various times in the history of the Christian church to ascribe to the Divine Being a form and parts like those of men. Thus, the Audeans (see ΑΥΔÆΥΣ), a Syrian monastic sect which sprang up in the 4th c., were accused, and, it would seem, justly, of holding that God was possessed of a human shape, and that, when the Bible said that "God created man in his own image," the words are to be understood of this shape

literally. The same error was at a later period ascribed to the Waldenses, but there is no evidence of the justice of the accusation. A tendency to A. may indeed be regarded as always existing, and so requiring to be guarded against in the mind of every man; but the instances have been rare and isolated, although they have from time to time occurred, in which anthropomorphic views have been fully adopted and openly expressed among Christians. The error of the anthropomorphites has, however, found countenance from the speculations of philosophers. Hobbes, Forster, and Priestley ascribed to the Divine Being a sort of subtle body. Fichte, on the other hand, rejected the very doctrine of the personality of the Divine Being as anthropomorphic, and represented God as the *moral order of the universe*; and Schelling, Hegel, Feuerbach, and Schleiermacher substituted for the objective personality of God a subjective consciousness of God in the human soul.—The term *anthropopathism* is sometimes employed to denote the ascription to God of human affections and passions, although A., in its most general sense, includes this. The language of Scripture, in the many instances of this kind, must be interpreted according to the same general principles which are applicable in those of A. strictly so called, with the same discrimination of the figurative from the literal, and the same constant recognition of the absolute spirituality and unchangeableness of God; yet so that important truths conveyed by means of such language, and which it is probable could only be conveyed to us by such language, in accordance with our mental constitution, may not be rejected or obscured. And here, it must be confessed, there is greater difficulty than with regard to A. strictly so called.

ANTHROPOPHAGI. See CANNIBAL.

ANTHUS and **ANTHIDÆ.** See PIPIT.

ANTHYLLIS. See KIDNEY VETCH.

ANTI'ARIS and **ANTJAR.** See UPAS.

ANTIBES (anciently *Antipolis*), a fortified seaport in the department of the Alpes Maritimes, in the s.e. of Provence, France, lat. 43° 34' n., long. 7° 8' e. Pop. '91, 7401. It stands on the e. side of a small neck of land called La-Garoupe, lying w. from the mouth of the Var, in a fertile district. The harbor is only serviceable, however, for small craft. It is a military station of the third rank, possesses a naval school, and has considerable trade in olives, dried fruits, salt fish, oil, etc. The anchovies prepared at A. are held in high estimation. The environs of the t. are beautifully adorned with gardens, vineyards, and orchards.

A. is a very old place, having been founded by a colony of Greeks from Massilia (Marseilles), of which it was a dependency. In the time of Augustus it was elevated to the rank of an Italian city, and must have attained a high degree of prosperity, if we are to judge from the ruins that still exist. After the wreck of the old Roman empire, A. suffered the fate of all classic cities in that region, becoming subject to successive tribes of barbarians from the north. In the 9th c., it was destroyed by the Saracens; in the 16th c., it was fortified by Francis I. and Henry IV.; during the Austrian war of succession, it sustained a siege of three months (1746); and, in recent times, gained some notoriety from having closed its gates against Napoleon on his return from Elba.

ANTICHLORE is the name given to commercial sulphite of soda by paper-makers. When the rags are reduced to a pulp, they are bleached by chloride of lime (bleaching-powder), which thoroughly soaks the pulp, and is very difficult to wash out. The traces of chlorine thus left in the pulp pass into the manufactured paper and tend to bleach the writing-ink which may be traced thereon. To free the pulp from the residue of the chlorine, some sulphite of soda is employed, and hence the name A., which literally signifies "against (*anti*) chlorine."

ANTICHRIST (from Gr. *anti*, against, and *Christos*, Christ). The general notion of A., as a power opposing itself to the reign of the Messiah, may be traced back beyond the Christian era. Its origin is perhaps to be found in the prophecy of Ezekiel concerning the doom of Gog and Magog. In accordance with the old saying, "When need is sorest, help is nearest," the Jews conceived that, immediately previous to the Messiah's reign, national adversity must be experienced in an extreme degree, and that an agent of Satan would appear, who must be overcome before prosperity could be restored. This was A. The idea is adopted in the New Testament, although the term A. occurs in no place of Scripture, except in the first and second epistles of John. From such passages as the prophecies of the Savior, Matt. xxiv. and Mark xiii., it has been inferred by some that probably the great truth which this conception was intended to shadow forth was similar to that illustrated in the life of "the man of sorrows"—that only through tribulation and strife could the reign of the Messiah be established; that Christ's kingdom, like Christ himself, could be made perfect only through suffering. And with this the language of John in his epistles, and of Paul in passages which seem to embody the same idea, is supposed to accord. Nor is it regarded as a fatal objection to this opinion, that in the Apocalypse the antichristian power or element is associated with the great heathen capital Rome, symbolically designated Babylon.

But this opinion neither has been nor is generally prevalent. The idea of A. early became associated with that of the millennium (q.v.), retaining a form very similar to that which it had among the Jews before the advent of the Messiah; and popular opinion

has always sought to find for it some actual and definite embodiment. In the 5th c., a popular delusion prevailed, founded on the passage in the Apocalypse, xvii. 8, that Nero was not dead, and would return in the character of A. Since the 16th c., the prevalent opinion among Protestants has been that A. is the Roman Catholic church; an idea entertained even at an earlier period, as, for instance, by Ludwig of Bavaria, regarding pope John XXII., by Occam, Wickliffe, and his pupil Cobham, and the Bohemian reformer Janow, and which seems to have prevailed to a considerable extent among the Hussites and other opponents of Rome. This opinion has, of course, been strenuously opposed by Roman Catholic writers, as by Bossuet, who, in his comments on the Apocalypse, ably advocates the opinion that pagan Rome was A. The opinions of Roman Catholics, however, are much divided upon this subject, many of them maintaining that A. is yet to come and "to raise the last persecution," as "no one has yet appeared to whom we can apply the character which the infallible word of God declares shall be that of the real A."—*Keenan's Catechism of the Christian Religion*.

The opinion prevalent among Protestants depends upon the identification of A. with the mystical Babylon of the Apocalypse, and with other symbolic representations in that book, of a power opposed to the cause of Christ, and also with the "wicked" one, the "man of sin," and "son of perdition," in 2d Thess. ii. Thus it is maintained that a definite embodiment of the idea of A. is to be sought in history, and that this is to be found in the church of Rome or in the papal power. And Protestants refer to the gradual growth and development of the errors which they regard as culminating in the church of Rome, as accordant with the declaration of Paul in 2d Thess. ii., that "the mystery of iniquity doth already work," and with that of John, "Even now are there many antichrists."

There have been, however, among Protestants eminent opponents of this opinion, among whom may be named Grotius. His own opinion was singular, that Caligula, the Roman emperor, was A. In the Greek church, the term A. has been understood as especially applicable to Mohammed, or to the dominion of the Turks and Saracens. Almost every great or striking event—the arrival of the year 1000; the beginning of the crusades; the "black death" and other plagues in the 14th c.; the career of Napoleon in 1805; and even the political movements of 1848 and 1849—has suggested new interpretations of the passages of Scripture regarding A. See REVELATION OF ST. JOHN.

ANTICLIMAX, in rhetoric, an abrupt declension by a writer or speaker from the dignity to which his idea has attained: as in the lines,

"The king of France, with twenty thousand men,
Marched up the hill—and then marched down again."

It is intentionally employed in ridicule or satire. Sometimes it partakes of the nature of antithesis; as, "Die; and endow a college, or a cat."

ANTICLINAL AXIS, a geological term denoting an imaginary plane of division between those portions of a stratum which dip in opposite directions downwards from a ridge lying between them.

ANTI-CORN-LAW LEAGUE, the name adopted by an association which concentrated the efforts of the free-trade party in Britain, and enabled them to carry the repeal of the corn-laws, and establish in practice the principle of free-trade. The results thus accomplished will have to be considered under other heads, as CORN-LAWS, FREE-TRADE, etc. This statement is limited to a brief account of the league itself, and its method of working. Associations to obtain the repeal of the corn-laws existed in several places before the embodiment of the league—one especially was founded in London in 1834. In 1838, Mr. Cobden and others took the opportunity of the periodical assemblages of the Manchester chamber of commerce for exposing the deleterious influence of the restrictive commercial policy on the manufactures and trade of the country. The friends of free-trade, at the same time, occasionally met in Manchester to discuss and promulgate their views; but it was in the beginning of 1839 that the strength of the party was first drawn to a focus by the appointment of delegates from the manufacturing districts to proceed to London, and press their principles on the legislature. Mr. Charles Villiers, afterwards president of the board of trade, undertook the leadership of their cause in the house of commons, of which Mr. Cobden, who subsequently served it so effectively, was not then a member. On the 19th of Feb., Mr. Villiers moved that the house resolve itself into a committee of inquiry on the corn-laws; and again, on the 12th of Mar., he moved that certain manufacturers be heard by counsel at the bar of the house against the corn-laws, as injurious to their private interest. The former motion was rejected by 242 to 195; the latter, by 361 to 172. Immediately on the return of the delegates from their unsuccessful effort, the league was formed. Its constitution dates from the 20th Mar., 1839, when resolutions were adopted, at a meeting in Manchester, for "the formation of a permanent union, to be called 'the anti-corn-law league,' composed of all the towns and districts represented in the delegation, and as many others as might be induced to form anti-corn-law associations, and to join the league.

"Delegates from the different local associations to meet for business from time to time at the principal towns represented.

"With the view to secure unity of action, the central office of the league shall be established in Manchester, to which body shall be intrusted, among other duties, those of engaging and recommending competent lecturers, the obtaining the co-operation of the public press, and the establishing and conducting of a stamped circular, for the purpose of keeping a constant correspondence with the local associations."

It was resolved that, in addition to the funds which local associations might provide for their own district purposes, £5000 should be put at the disposal of the central body, and that every person, or collection of persons, contributing £50, should have one vote in its deliberations. The league collected and distributed large sums of money. Just before its principles became triumphant in the free-trade legislation of 1846, it demanded a quarter of a million, which would have been supplied had it been necessary.

It is of the greatest moment that the cause of the success of the league should not be misunderstood: it triumphed not by possessing money, but by teaching scientific truth. It was a great organization for educating the country in political economy. The leading principles of this science were so little known when the league began, and had been so effectually promulgated before its end, that a majority of the parliament who, in 1841, had been elected for the support of protection, were converted to free-trade, the conversion including the prime-minister, Sir Robert Peel. The key note to the literature of the league was struck by the beautiful logical exposition of free-trade in Gen. Thompson's *Catechism of the Corn-laws*, which, with other tracts, was profusely dispersed over the country, while a large staff of lecturers aided in the task of education. Thinking to serve their cause in the same manner, the protectionist party, at a meeting held in the duke of Somerset's house, on 17th Feb., 1844, founded "the agricultural protection society of Great Britain." This body had inexhaustible wealth at command, but in reality its exertions only helped to further the cause of free-trade, by promoting discussion, and prompting people to work out the question for themselves. See FREE TRADE: TARIFF.

ANTICOS TI, an island in the gulf of St. Lawrence, with light-houses at different parts of the coast, between lat. 49° and 50° n.; and long. 61° 40' and 64° 30' w. It is estimated to contain 2500 sq.m. Neither to the settler nor to the mariner is A. of any value. It is destitute of harbors, the n. shore being mountainous, and the s. low and beset by shoals; while, to increase the danger, the neighboring currents are said to be capricious. The climate is severe; while the surface is an alternation of rocks and swamps. The principal inhabitants are the keepers of the light-houses. Pop. '91, 253. The island is surrounded by considerable salmon, trout, cod, and herring fisheries. It is a valuable resort for seal and bear hunting. The most extensive peat deposits in the dominion are found in A. Marl also exists in most of the small lakes and ponds along the coast.

ANTICYRA, a city of Phocis on the Corinthian gulf. The people were expelled by Philip of Macedon, and subsequently it fell under the Romans. The site is yet discernible, and is known as Aspra Spitia, or the white houses.—Another A. was a city of Thesaly, famous for producing hellebore, which was deemed a cure for madness.

ANTIDOTE (Gr., given against), a counter-poison. See POISONS.

ANTIE TAM, BATTLE OF, Sept. 17, 1862; one of the most important conflicts in the late civil war in the United States, 1861–65. The name is taken from a small but deep river in Maryland, emptying into the Potomac, 6 m. above Harper's Ferry. The battle was the result of an attempt of the confederates to capture the city of Washington, in the expectation that Maryland would then join their cause and insure final victory. The federal army was commanded by Gen. George B. McClellan, and the confederates by Gen. Robert E. Lee. On the 4th, 5th, and 6th of Sept., the confederates crossed the Potomac near Leesburg, and occupied Frederick and the country along the Monocacy. McClellan threw a part of his army between them and the fords of the Potomac, forcing Lee to leave Frederick on the 12th, the latter marching towards Hagerstown. On the 10th "Stonewall" Jackson, the confederate general, had moved by forced marches towards Harper's Ferry, which important position, with 12,000 men, surrendered to him on the 15th. Meanwhile the federal army followed Lee towards the north, and on the 14th took Crampton's Gap and the heights of South Mountain, forcing Lee to retreat over the Antietam to Sharpsburg. On the 16th the federals under Gen. Hooker gained advantage in a sharp engagement, and on the 17th the real battle was begun by Hooker, who drove back the left wing of the confederates under Jackson, while Gen. Burnside engaged their right wing. The battle raged around a cornfield surrounded by woods, to which Hooker had driven the enemy. The federal troops were twice repulsed, but gained the position on the third attack. Hooker was wounded, and the command fell to gen. Sumner. Meanwhile on the extreme left Burnside had twice unsuccessfully tried to cross the A., but at 3 p.m. drove the enemy until a range of hills occupied by batteries checked him. At 4 o'clock he was ordered to take the position at any cost, and took the first battery. But the arrival of Gen. A. P. Hill's division strengthened the confederates, and Burnside reported that he could not hold his position if not assisted by McClellan with the federal reserve. McClellan did not heed this demand, and the federals were driven back to the bridge, which the confederates declined to attack. When darkness ended the contest, the federals had gained advantages at most points, but not a decided success. In the morning Lee asked and was granted a truce to bury

the dead, and while this was going on he retreated to the right bank of the Potomac, without serious resistance. The federal force numbered 87,164, and that on the other side is variously stated from 40,000 to 90,000. The federal losses were 2010 killed and 10,459 wounded; the confederate losses have never been ascertained, though some of their writers put 9000 as the total. The result was to put the confederates on the defensive, and to hasten the emancipation proclamation, then contemplated by President Lincoln.

ANTI-FEDERALISTS, the name given under the administration of Washington to the party opposed to any centralizing tendency in the interpretation of the Federal Constitution. Its first great leader was Thomas Jefferson (q.v.), and it soon received the name Republican Party, then Democratic-Republican Party, and finally Democratic Party. See **REPUBLICAN**; **UNITED STATES**; **PARTY NAMES**.

ANTIGONE, a character of the heroic age of Greece, daughter of Œdipus by his own mother Jocasta, was sister to Eteocles, Polynices, and Ismene. She accompanied her father in his exile into Colonus in Attica, and after his death returned to Thebes. Eteocles, the king, had banished his brother Polynices, who, coming back with an army, engaged him in single combat. Both fell, and Creon, who after their death had become tyrant of Thebes, issued an edict forbidding their interment. A. alone dared to disobey. She buried Polynices, and was in consequence seized by the monster, who shut her up, either in the same tomb with her brother, or in a subterranean cave, where she perished. This sentence threw Hæmon, son of Creon, who was betrothed to A., into such despair that he destroyed himself. A., as the ideal of feminine duty and filial devotion, has been immortalized by Sophocles in his dramas of *Œdipus at Colonus* and *Antigone*.—A., daughter of Eurytion, and wife of Peleus, who hanged herself upon hearing a false report of her husband's marriage to Sterope, daughter of Acastus.—A., daughter or Laomedon, and sister of Priam, who, having offended Juno by comparing her own beauty to that of the goddess, had her hair turned into snakes, which so tormented her, that the gods, in compassion, changed her into a stork.

ANTIGO'NISH, a co. in n.e. Nova Scotia; 500 sq.m.; pop. '91, 16,117. Coal is one of the chief products. The capital of the same name.

ANTIGONUS. Of the numerous persons who bore this name, the most celebrated was the son of Philip of Elymiotis, and one of the generals of Alexander the Great. In the division of the empire which followed the death of his master, A. received the provinces of Phrygia-Major, Lycia, and Pamphylia. Being accused of disobedience by Perdiccas, who wished to gain possession of all the territories left by Alexander, A. entered into alliance with Craterus, Antipater, and Ptolemæus, and declared war against Perdiccas in 321 B.C. In the same year, Perdiccas was assassinated by his own soldiers; but A. carried on the war against Eumenes, to whom Perdiccas had given rule over Paphlagonia and Cappadocia. Eumenes, and afterwards Seleucus, who reigned in Syria, were deposed by A., whose ambition and cupidity now knew no bounds. He seized the treasures of Alexander kept at Ecbatana and Susa, which he refused to share with his allies, Ptolemæus, Cassander (son of Antipater), and Lysimachus. All the other generals now allied themselves against him, and a long series of contests took place in Syria, Phœnicia, Asia Minor and Greece, which ended with the battle of Ipsus in Phrygia (301 B.C.), when A. was slain, in his 81st year.

ANTIGONUS GONA TAS was the son of Demetrius Poliorcetes, king of Macedonia and grandson of the great Antigonus. On his father's death, B.C. 283, various claimants for the throne appeared, and much confusion ensued, the result of which was that the royal power fell into the hands of Ptolemæus Ceraunus, who, however, soon after perished in a battle with the Gauls, when A. G. at length became ruler of the country (277 B.C.), and governed precariously in that age of intrigue, dissimulation, and violence for 33 years. He was twice expelled from his dominions by a hostile force from Epirus, but found refuge and assistance in the Peloponnesus. The close of his career was comparatively peaceful. He d. in 243 B.C.

ANTI'GUA, a West India island, the most important of the Leeward islands (see **ANTILLES**), and the residence of the governor-in-chief of the British portion of the group. It lies in w. long., between 61° 44' and 61° 58'; and in n. lat., between 17° 2' and 17° 13'. Its area was estimated, in 1891, at 69,120 acres, of which nearly all were under cultivation. In the same year, the population of Antigua with Barbuda and Redonda was 36,819. It was first settled in 1632, having till then remained, in fact, uninhabited on account of the great scarcity of fresh water. It has twice suffered severely from earthquakes—in 1689 and 1843; while of hurricanes also, the other heavy scourge of the group, A. has had its full share. Numerous islets, rocks, and shoals border the shore, so that, generally speaking, access is difficult and dangerous. But St. John's, the chief t., stands at the head of a safe and capacious bay, which unfortunately, however, does not admit large vessels. English Harbor is, on the whole, a more commodious port, and has been selected as the station of the royal mail steam-packets. It is said to be capable of receiving the largest ships in the British navy.

A. is chiefly of tertiary formation. The s. and w. show grauwacke, porphyry, trap, breccia, amygdaloid, and basaltic greenstone; the n. and e. exhibit calcareous marl and

coarse sandstone, interspersed with blocks of limestone; while the interior presents argillaceous strata and irregular beds of coarse flint.

Besides provisions, generally almost sufficient for its own consumption, A. produces large quantities of sugar, molasses, and rum. In this respect, the emancipation of the slaves appears to have been rather beneficial than otherwise. In 1893, the total tonnage of vessels which entered and cleared A. was 480,060. The value of imports was, in the year 1893, £178,931; of exports, about £199,870. Sugar is the main article of export, but there is also a considerable foreign trade in molasses, rum and pineapples.

In connection generally with the emancipation of the slaves, of whom, immediately previous to the abolition of slavery, A. had about 30,000, it seems to have occupied a prominently creditable position. Immediately after the passing of the imperial statute on the subject, the local legislature, rejecting the intermediate and probationary state of apprenticeship, proclaimed unqualified freedom from 1st Aug., 1834—a bold measure, which proved to be as judicious as it was humane.

ANTILEGOMENA, a name given by the early Christian writers to those books of the New Testament which, though sometimes read in the churches, were not for a time admitted to be genuine or received into the canon of Scripture. They were: epistle to the Hebrews, epistle of James, second epistle of Peter, second and third epistles of John, epistle of Jude, and the book of the revelation of John.

ANTI-LIBANUS, or **ANTI-LEBANON**, a mountain ridge in Palestine and Syria, about 90 m. long, running n.e. and s.w. nearly parallel with the Lebanon ridge, from which it is separated by the valley of Cælo-Syria. Mt. Hermon is the highest peak, 9000 or 10,000 ft., on whose sides rises the river Jordan. The A.-L. is lower than the Libanus range, and less continuous.

ANTILLES, a term used to designate generally the whole of the West India islands, except the Bahamas. Generally speaking, they stretch eastward from the gulf of Mexico to about the meridian of the gulf of Paria; then southward to the gulf of Paria itself; and lastly, westward to the gulf of Maracaybo. Primarily, however, they are regarded not as three sections, but as two—the greater A., to the n. and w.; and the lesser, to the e. and the s. This distinction, which obviously involves considerations of position as well as of magnitude, will be found to indicate also a difference of organic structure.

The greater A., reckoning from the w., are: Cuba (Spanish), Jamaica (British), Hayti (independent), and Porto Rico (Spanish). They extend in w. long. from 84° 58' to 65° 40', and in n. lat. from 23° 9' to 17° 40'—the higher of these two parallels being only 21', or about 25 m., within the tropic of Cancer. On the lowest estimate, the area is said to amount to 70,000 sq.m. The greater A. appear to be of primitive formation, presenting lofty granitic mountains. In Jamaica, however, there are many hills of calcareous origin.

The lesser A. may be divided into two chains—the eastern, trending round from the eastward of Porto Rico to the gulf of Paria; and the southern, stretching away in a direction nearly parallel with that of the greater A., along the coast of Venezuela as far as the gulf of Maracaybo. By the Spaniards, followed by some other nations, the latter chain is termed the Leeward islands, and the former the Windward islands. In English and French phraseology, however, the Leeward islands are all those to the n. of 15° n. lat., and the Windward islands all those s. of that parallel.

In the latter sense of the name, the Leeward islands, reckoning from the n., come in pretty nearly the following order: Virgin islands (Danish and British), Anegada (British), Anguilla (British), St. Martin (French and Dutch), St. Croix (Danish), Saba (Dutch), St. Bartholomew (French), St. Eustatius (Dutch), Barbuda (British), St. Christopher's (British), Nevis (British), Antigua (British), Montserrat (British), Desecada (French), Guadeloupe (French), Marie Galante (French), Dominica (British). They extend in w. long. from 65° 30', at the w. extremity of the Virgin isles, to 61° 23', at the e. extremity of Dominica; and in n. lat. from 18° 48', at the n. extremity of Anegada, to 15° 10', at the s. extremity of Dominica. The area is about 5000 sq.m.

The Windward islands, reckoning from n. to s., and then from e. to w., may be given as follows: Martinique (French), St. Lucia (British), Barbadoes (British), St. Vincent (British), Grenadines (British), Grenada (British), Tobago (British), Trinidad (British), Testigos (Venezuelan), Margarita (Venezuelan), Tortuga (Venezuelan), Blanquilla (Venezuelan), Buen Ayre (Dutch), Curaçoa (Dutch), Aruba (Dutch). They extend in w. long. from 59° 20', at the e. of Barbadoes, to 70° 11', at the w. of Aruba; and in n. lat. from 11°, at the s. of Margarita, to 14° 55', at the n. of Martinique. Their entire area cannot exceed 1500 sq.m. The Windward islands, in the Spanish sense of the term, are otherwise called the Caribbees; and hence the sea which they cut off from the open Atlantic is called the Caribbean sea (q.v.).

The lesser A., as a whole, appear to be chiefly of coral formation, or of volcanic origin. Many of them contain extinct craters; and, though not destitute of harbors, their coasts are rendered in a great measure inaccessible by reason of reefs.

The A. generally—but perhaps the lesser more so than the greater—are subject to

hurricanes and earthquakes. Their principal productions are sugar, rum, cotton, coffee, etc. The individual islands will be found noticed in detail in their respective places.

The name A. is generally supposed to have been given by mistake to the West Indian islands. Before the discovery of America by Columbus, a tradition existed that far to the w. of the Azores there lay a land called Antilla, whose position was vaguely indicated in the maps of the early cosmographers. Only eight months after Columbus's return we find one Peter Martyr writing that the islands which the great navigator had touched upon must be the Antillæ; and it is certain that Cuba and Hayti were known as such before a single link in the Caribbean chain was discovered.

ANTILOPE. See ANTELOPE.

ANTI-MASONS, the name of a political party in New York and other states, organized in 1827-28. It was the result of a remarkable excitement over the fate of William Morgan, a tailor of Batavia, N. Y., who was said to be about to publish, or betray, the secrets of the masonic order, of which he was a member. He disappeared suddenly, and his fate has never been satisfactorily explained. There was a search, and he was traced to the Niagara river, near which it was discovered that he had been temporarily in prison. The opponents of freemasonry declared that he had been murdered, and sunk in the river or lake. Legal inquiries followed, but proved nothing. At or about that time the governor of the state was a mason of the most advanced degrees, and probably a majority of all public officers were members of the order. A wild excitement grew up in western New York, and the anti-masonic party was formed, casting 33,000 votes in 1828, about 70,000 in 1829, and 128,000 in 1830, though many in the latter year were anti-Jackson men, without reference to masonry. In 1832, the party nominated William Wirt for president, but carried only one state, Vermont. In 1835, through a democratic split, they elected the governor of Pennsylvania. After this the party fell as rapidly as it rose, and has not since made any conspicuous figure in politics. A great majority of the anti-masons became members of the whig party.

ANTIMONY—*symb. Sb* (Lat. *Stibium*) equiv. 120—is a brittle metal of a flaky, crystalline texture and a bluish-white color. It is readily reduced to powder by ordinary pulverization; heated to 797° F. (425° C.), it fuses, and thereafter being allowed to cool, it solidifies in rhombohedral crystals, which are isomorphous with those of arsenic. Heated in a retort, where the oxygen of the air is excluded, as in an atmosphere of hydrogen, A. volatilizes as the vapor of the pure metal. When raised in temperature in contact with the air, it burns with a white light—combining with the oxygen of the atmosphere, and forming copious white fumes of the teroxide of A., or “flowers of A.” The metal is a bad conductor of heat and electricity, but may be used, in conjunction with bismuth, in the construction of thermo-electric piles. Exposed to the air at ordinary temperatures, A. does not tarnish or rust; and this property, combined with the hardness of the metal and of its compounds, renders A. of essential service in the useful arts, in the construction of alloys, such as britannia metal, type metal, and plate pewter. It is likewise employed in the preparation of the large concave mirrors used in astronomical observations; and in the casting of bells, to make them harder and whiter, and to give them a clearer and stronger sound.

The principal natural sources of A. are—*gray* or *crude* A. of commerce, which is the impure tersulphuret of A. (Sb_2S_3); and *native* A., in which it occurs in the metallic state associated with silver, iron, and other metals. The extraction of A. from its ores is mainly carried on at Linz in Germany, where the sulphide of A. is found extensively, and in Great Britain, which receives its supply of ore from Singapore and Borneo, commonly as ballast. The process consists in heating the crude ore, covered with charcoal, on the bed of a furnace, when the sulphide of A. fuses, leaving unmelted the earthy impurities; and thereafter the liquid is drawn off into iron molds, where it solidifies into cakes or loaves. The latter are reduced to coarse powder, placed on the bed of a reverberatory furnace, and heated with access of ordinary air containing oxygen, when the sulphur passes away as gaseous sulphurous acid SO_2 , leaving behind the A. as the teroxide Sb_2O_3 . The roasted mass is now mixed with one sixth of its weight of powdered charcoal, the whole moistened with a solution of carbonate of soda, and raised to bright redness in crucibles, when the metal A. trickles to the bottom, and the impurities are left above in the spent flux or scoria, which is known in the arts by the name of *crocus* of A.

The compounds of A. are numerous: with oxygen it forms (1) the *teroxide* of A., or *white A. ore*, Sb_2O_3 , which enters into the composition of tartar emetic; (2) *antimonious acid*, Sb_2O_4 , which forms one of the components of Dr. James's powders; (3) *antimonic acid*, Sb_2O_5 , a very insoluble compound, obtained by acting upon the metal with concentrated nitric acid. With sulphur, A. forms the *tersulphide*, Sb_2S_3 , already referred to as a natural ore of the metal, and which, when roasted at a temperature sufficient to fuse it, passes into the mixed teroxide and tersulphide of A. known commercially as the *glass* of A. A native oxysulphide, of a pretty red color, is called *red A. ore*. When the ordinary sulphide of A. is boiled with potash, or the carbonate of potash, it dissolves, and thereafter, on boiling, deposits a reddish-brown substance known as *mineral kermes*. The liquid from which the deposit has fallen, if treated with hydrochloric acid, throws down an orange precipitate of *golden sulphide* of A.

There is also a chloride of A., SbCl_3 , prepared by heating sulphide of A. and hydrochloric acid together, and which has the common name of *butter* of A. It is generally obtained as an oily liquid, of the consistence of melted butter, and of a golden yellow color. Mixed with olive oil, it is used by gunmakers as *bronzing salt*, to impart a yellow color to gun-barrels.

The various compounds of A. are used as medicinal agents, both in human and veterinary practice, especially the *tartar emetic*, a double tartrate of antimony and potash $(\text{KSbOT})_2\text{H}_2\text{O}$, which is the active ingredient in antimonial wine, sherry constituting the bulk of the compound. Cases have occurred where tartar emetic has been used criminally as a poison.

ANTINOMIANISM (Gr. *anti*, against, and *nomos*, law), the doctrine or opinion that Christians are freed from obligation to keep the law of God. It is generally regarded by the advocates of the doctrine of justification by faith, as a monstrous abuse and perversion of that doctrine, upon which it usually professes to be based. From several passages of the New Testament, as Rom. vi., and 2 Pet. ii. 18, 19, it would seem that a tendency to A. had manifested itself even in the apostolic age; and many of the Gnostic sects were really antinomian, as were probably also some of the heretical sects of the middle ages; but the term was first used at the time of the Reformation, when it was applied by Luther to the opinions advocated by John Agricola. Agricola had adopted the principles of the reformation; but in 1527 he found fault with Melancthon for recommending the use of the law, and particularly of the ten commandments, in order to produce conviction and repentance, which he deemed inconsistent with the gospel. Ten years after, he maintained in a disputation at Wittenberg, that as men are justified simply by the gospel, the law is in no way necessary for justification, or for sanctification. The "Antinomian Controversy" of this time, in which Luther took a very active part, terminated in 1540 in a retraction by Agricola; but views more extreme than his were afterwards advocated by some of the English sectaries of the period of the commonwealth; and, without being formally professed by a distinct sect, A. has been from time to time reproduced with various modifications. It ought, however, to be borne in mind that the term A. has no reference to the *conduct*, but only to the *opinions* of men; so that men who practically disregard and violate the known law of God, are not therefore antinomians; and it is certain enough that men really holding opinions more or less antinomian, have in many cases been men of moral life. It is also to be observed that the term A. has been applied to opinions differing very much from each other. In its most extreme sense it denotes the rejection of the moral law as no longer binding upon Christians; and a power or privilege is asserted for the saints to do what they please without prejudice to their sanctity; it being maintained that to them nothing is sinful; and this is represented as the perfection of Christian liberty. But besides this extreme A., than which nothing can be more repugnant to Christianity, there is also sometimes designated by this term the opinion of those who refuse to seek or to see in the Bible any positive laws binding upon Christians, and regard them as left to the guidance of gospel principles and the constraint of Christian love; an opinion which, whatever may be thought of its tendency, is certainly not to be deemed of the same character with the other. Probably, the A. that does not arise out of a dislike of morality, usually originates in mistaken notions of Christian liberty, or in confusion of views as to the relation between the moral law and the Jewish law of ceremonial ordinances.

AN'TINOMY, the word used by Kant to mark the inevitable conflict or contradiction into which, in his view, the speculative reason falls with itself when it seeks to conceive the complex of external phenomena, or nature, as a world or cosmos. Literally, the word means a conflict or opposition of laws. It is used by Kant both in a generic, and in a specific sense; the necessity that lies upon the speculative endeavors of human reason taking the form of four special contradictions. For the generic sense Kant also has the word *Antithetic*, each antinomy being set forth in the shape of thesis and antithesis, with corresponding demonstrations, the perfect validity of which, in all cases, he positively guarantees. Briefly, his theses are: The world (1) is limited in space and time, (2) consists of parts that are simple, (3) includes causality through freedom, (4) implies the existence of an absolutely necessary being. Over against these stand the antitheses: The world (1) is without limits in space or time, (2) consists of parts always composite, (3) includes no causality but that of natural law, (4) implies the existence of no absolutely necessary being. Kant overcomes these antinomies by showing that the contradiction is not real if critically considered with due discrimination between noumena and phenomena. Sir William Hamilton's view, in his *Philosophy of the Conditioned*, is not the same as Kant's theory of A., though a connection is traceable between the two. See **CATEGORIES: KANT**.

ANTIN'OUS, a beautiful youth of Claudiopolis, in Bithynia. He was page to the emperor Hadrian, and the object of his extravagant affection, accompanying him in all his travels, but was either drowned accidentally in the river Nile, or as some suppose, committed suicide from a loathing of the life he led, in 123 A.D. His memory and the grief of the emperor were perpetuated by many statues and bas-reliefs, of which several are very beautiful, especially two now in Rome—one found in the baths, and the other in the villa of Hadrian. "In all figures of A.," says Winckelmann, "the face has a rather melancholy expression; the eyes are large, with fine outlines; the profile is gently

sloped downwards; and the mouth and chin are especially beautiful." The city of Besa, in the Thebais, near to which A. was drowned, was also rebuilt by Hadrian, and the name of Antinöpolis conferred upon it, in memory of his favorite. A. was further enrolled amongst the gods, and temples erected to him in Egypt and Greece. See *illus., SCULPTURE*, vol. XIII.

ANTIOCH, the ancient capital of the Greek kings of Syria, was the most magnificent of the 16 cities of that name built by Seleucus Nicator. Its situation was admirably chosen. The river Orontes, issuing from the mountains of Lebanon, flows n. as far as the 36th parallel of lat., and then s.w. into the Levant. On the left bank of the river, after it has taken this last direction, and at a distance of 20 m. from the sea, lay the famous city, in the midst of a fertile and beautiful plain, 10 m. long by 5 broad. By its harbor, Seleucia, it had communication with all the maritime cities of the west, while it became, on the other hand, an emporium for the merchandise of the east; far behind it lay the vast Syrian desert, across which traveled the caravans from Mesopotamia and Arabia. On the north, the plain of A. is bounded by the mountain-chain of Amanus, connected with the south-eastern extremity of Mt. Taurus; and on the s., which is more rocky, by the broken declivities of Mount Casius, from which the ancient town was distant less than 2 miles. In early times, a part of the city stood upon an island, which has now disappeared. The rest was built partly on the plain, and partly on the rugged ascent towards Mount Casius. The slopes above the city were covered with vineyards, while the banks of the river displayed, as they do even at the present day, a gorgeous profusion of eastern fruit-trees. The ancients called it "A. the beautiful," "the crown of the east," etc. It was a favorite residence of the Seleucid princes and of the wealthy Romans, and was famed throughout the whole world for the abundance of its conveniences and the splendor of its luxury. It received from Strabo the name of *Tetrapolis*, on account of three new sites having been successively built upon, and each surrounded by a wall. Its public edifices were magnificent. The principal were—the palace; the senate-house; the temple of Jupiter, burnished with gold; the theater, amphitheater, and Cæsarium, besides an aqueduct, a public promenade, and innumerable baths. At the beginning of the Roman empire, it was as large as Paris, and for many generations after, continued to receive numerous embellishments from the emperors. Nor did its glory fade immediately after the founding of Constantinople, for though it then ceased to be the first city of the east, it rose into new dignity as a Christian city. Ten councils were held in it. Churches sprang up exhibiting a new style of architecture, which soon became prevalent; and even Constantine himself spent a considerable time here, adorning it, and strengthening its harbor, Seleucia. The Antiochenes themselves, however, brought about the ruin of their beautiful city. They were famous, above all other people in ancient times, for their biting and scurrilous wit, and for their ingenuity in devising nicknames; and when the Persians, under Chosroes, invaded Syria in 538 A.D., the Antiochenes could not refrain from jesting at them. The Persians took ample revenge by the total destruction of the city, which, however, was rebuilt by Justinian. The next important event in its history was its conquest by the Saracens in the 7th century. In the 9th c. it was recovered by the Greeks under Nicephorus Phocas, but in 1084 it again fell into the hands of the Mohammedans. The crusaders besieged and took it on the 3d of June, 1098. At the close of the 13th c., the sultan of Egypt seized it: since then it has undergone a variety of vicissitudes, and at present forms a portion of Syria, in the eyalet of Aleppo. Its modern name is *Antakieh*. It exhibits almost no traces of its former grandeur, except the ruins of the walls built by Justinian, and of the fortress erected by the crusaders. Its manufactures are few and unimportant. In 1872 A. was mostly destroyed by an earthquake. Pop. est. 23,600.

ANTIOCH COLLEGE, at Yellow Springs, Greene co., Ohio, was organized and named in a convention of the Christian Denomination held in Marion, Wayne co., N. Y., Oct. 2, 1850. It claims to be the first college in the world to admit both sexes of all races to equal privileges. It is entirely unsectarian and is under 20 trustees, who choose their own successors, as a close corporation. Edward Everett Hale, D.D., of Boston, Mass., is (1897) the oldest trustee by election. In 1896, the Hon. F. A. Palmer, of New York, added to its endowment a chair of Christian Ethics which bears his name. Its presidents have been Horace Mann, LL.D., 1853-59; Thomas Hill, D.D., 1859-62; Austin Craig, D.D. (with leave of absence, J. B. Weston, D.D., acting), 1862-65; Austin Craig, D.D. (acting), 1865-66; George W. Hosmer, D.D., 1866-73; Edward Orton, A.M., 1873; S. C. Derby, A.M. (acting), 1873-76; Rev. O. J. Wait, A.M., 1882-83; Daniel A. Long, D.D., LL.D., 1883-.

ANTIOCHUS, a common Greek name, was borne by 13 kings of Syria, 4 kings of Commagene (a small country between the Euphrates and Mt. Taurus), and many other persons of note (see Smith's *Dictionary of Greek and Roman Biography*). A. Soter, the first of the Syrian dynasty, or Seleucidæ, as they were called from their founder, was the son of Seleucus, the general and one of the successors of Alexander. A. was the fruit of one of those marriages which Alexander celebrated at Susa between his generals and the princesses of Persia. His mother's name was Apama. From this fact we gather that A. was probably born in 324 B.C. For the earlier career of A., see **SELEUCUS**. On the murder of his father in 280 B.C., A. succeeded him in his dominions, but he after-

wards permitted Antigonus Gonatas to retain possession of Macedonia on his marrying Phila, a daughter of Seleucus. A. was much occupied in wars with the Gauls, who invaded Asia Minor, and, on one occasion, is said to have gained a victory over them by the help of his elephants, from which circumstance he derived the name of Soter (savior). He was subsequently killed in a battle with the Gauls (261 B.C.), and was succeeded by his son A. II. This A. is mentioned in the book of Daniel (xi. 6) as the king of the north—the king of the south being Ptolemy, whose daughter, Berenice, A. had been compelled to marry. On the death of Ptolemy, A. recalled his former wife, Laodice; but she, in revenge for the insult which she had received, caused A. to be murdered, along with Berenice and her son. A. lost the provinces of Parthia and Bactria.

But the most distinguished of the Seleucidæ was A. III., surnamed the Great, who was the son of Seleucus Callinicus, and grandson of the preceding. In his earlier wars with Ptolemy Philopator, A. was generally successful; and though he was defeated in a great battle fought near Gaza, he afterwards, by his victory over the Egyptian general, Scopas, obtained entire possession of Palestine and Cœle-Syria. In this war he was assisted by the Jews, to whom he granted many privileges. Fearing the power of the Romans, A. at length concluded a peace with Egypt, betrothed his daughter Cleopatra to the young king Ptolemy, and gave her Cœle-Syria and Palestine as a dowry. The formidable enemy which he thus hoped to escape encountered him at a later period of his career. Having conquered Philip of Macedonia, the Romans no longer dreaded a war with A., and accordingly sent him an embassy, demanding the surrender of the Thracian Chersonese, and of the places which he had conquered from Ptolemy, whose guardian the Romans had become. In 191 B.C., he was entirely defeated by the consul Acilius Glabrio at Thermopylæ, and compelled to return to Asia. Having a second time tried the fortune of war, he was defeated by Scipio, who had crossed over into Asia, and very severe terms were imposed on him. He found so much difficulty in raising money to pay the tribute the Romans demanded, that he was led to plunder a temple in Elymais, when the people rose against him, and killed him (187 B.C.). The fate of A. was foretold in the book of Daniel (xi. 18, 19).

A. IV. (175–164 B.C.), surnamed Epiphanes, by his tyranny and sacrilege, excited the Jews to a successful insurrection under their leaders Mattathias, Judas Maccabæus, and the other members of that heroic family. The monstrous life of A. is recorded in the books of the Maccabees. The last of the Seleucidæ, A. XIII., surnamed Asiaticus, was deprived of his kingdom by Pompey, who reduced Syria to a Roman province (65 B.C.).

ANTIOQUIA, one of the United Colombian states, between 8° 9' and 5° 3' n., and 74° 3' and 76° 13' w.; 22,316 sq.m.; pop. '81, 470,000, of whom about one fifth are white, the remainder being mestizos (or white and Indian mixed), mulattoes, and Indians. The Andes spread over nearly all the state. The Magdalena river forms the eastern boundary, and is navigable for light draft steamers. The river Cauca flows through the state. A. is rich in gold mines, has a fertile soil, and is prolific in cattle. Iodine springs are common, and useful in preventing goitre, which prevails in some of the states. Capital, Medellin.

ANTIPÆDOBAPTIST, a term exactly designating one who objects to child-baptism. As such a one, however, is generally known in this country under the name Baptist, see **BAPTIST**.

ANTIPÆROS (anciently called Olearos or Oliaros), one of the Cyclades islands, celebrated for a stalactitic cave, is separated from Paros by a narrow strait. It contains about 400 inhabitants, and forms a part of the eparchy of Naxos. A. is 7 m. in length by about 3 in breadth; it is scantily supplied with water, but the flats in the north and west are tolerably fertile. Corn and wine are cultivated, but not to any great extent. The principal occupation of the inhabitants is fishing. From Kastron, the only village in the island, the distance to the celebrated grotto is about an hour and a half's ride. This wonderful cave is not alluded to by any Greek or Roman writer whose works are extant, but must have been visited by the curiosity-hunters of antiquity, for, in 1806, Colonel Leake deciphered a Hellenic inscription which contained the names of those who had descended into it in ancient times. It is situated in the side of a mountain on the s. coast of the island, which is described as a mass of white marble. The top or entrance of the cave has a striking appearance; but the sloping descent is rather dangerous, on account of the cord by which the traveler holds being extremely slippery from constant humidity. The bottom once reached, and the grotto entered, there is presented to the eye as dazzling a specimen of stalactitic formation as can well be conceived—the roof, floor, and walls of the various chambers, all glittering with the most gorgeous incrustation, though it is said that the smoke of the torches and the constant fingering of visitors are sully the primitive purity of the massive columns. It is believed that there are other caves of equal splendor in the vicinity which have not yet been discovered. The height of the known cavern is 80 ft.; its length and breadth more than 300; but it seems the eye can only take in at once a length of 150 ft., and a breadth of 100. The grotto was first made known to the modern world in 1673, by the then French ambassador to the Porte, M. de Nointel.

ANTIPAS. See **HEROD ANTIPAS**.

ANTIPATER. Of the many persons who bore this name in antiquity, the most celebrated was one of the generals and confidential friends of king Philip of Macedonia. When Alexander led his troops into Asia, he left A.—who, along with Parmenion, had endeavored to dissuade him from the expedition—as governor of Macedonia. A. discharged the duties of this office with great ability, suppressing the insurrections in Thrace and Sparta; but Olympias, the mother of Alexander, who entertained a dislike to A., prevailed on her son to appoint Craterus as regent of Macedonia. Alexander, prompted also, it is supposed, by his own jealousy of A., consented, but died before the change was carried into effect; and A. was left to share with Craterus the government of Alexander's territories in Europe. The government of Macedonia was assigned to him; and soon after he was called upon to defend himself against an alliance of the Grecian states. With the assistance of Craterus—on whom he afterwards bestowed his daughter Phila in marriage—and to a certain extent of Leonnatus, he succeeded in reducing the allies to subjection. Democracy at Athens was abolished, a garrison admitted into Munychia, and the leaders of the popular party put to death. When Demosthenes was summoned to the presence of A., he took poison, which for some time he had been carrying on his person, and died in the temple of Poseidon (322 B.C.). This war was followed by another with Perdiccas, who was also his son-in-law, in which A. was again successful. After the murder of Perdiccas in 321 B.C., A. was appointed to the supreme regency of the kingdom, and the guardianship of Alexander's children. He died at an advanced age, in B.C. 318 or 319, leaving the regency to Polysperchon, to the exclusion of his own son Cassander.

The others of this name were: I. A., second son of Cassander, king of Macedonia, who lived in the 3d c. B.C.—II. A., the father of Herod the Great. He flourished in the days of Pompey and Julius Cæsar, was a firm friend of the Romans, and about the year 47 B.C. was appointed procurator of Judea. He was poisoned in 43 B.C. by one whose life he had twice saved.—III. A., grandson of the former, and son of Herod the Great by his first wife Doris, a worthless prince, who was perpetually conspiring against the life of his brothers, until his trial and condemnation at Jerusalem before Quintilius Varus, the Roman governor of Syria. He was executed in prison five days before Herod died, and in the same year with the massacre of the innocents at Bethlehem.

A. has likewise the name of various eminent men in ancient times—physicians, philosophers, historians, poets, mathematicians, and grammarians.

ANTIPATHY is the term applied to a class of cases in which individuals are disagreeably affected by, or violently dislike, things innocuous or agreeable to the majority of mankind. These peculiarities are no doubt sometimes acquired in early life by injudiciously terrifying children with some object, the mental impression becoming permanent. A large class of persons have an A. to animal food, and from childhood refuse to taste it. In others, again, the aversion is limited to one kind of meat, as veal or pork; others are averse to eggs or milk. Nor is this feeling a conscious caprice, which an exertion of the will might remove; for it is generally found that contact with the object of the A. is resented by the bodily economy, and symptoms of poisoning are rapidly produced. Some are affected with these symptoms who have no mental aversion to the article. We read of a countess who had a liking for beef-udder, but directly it touched her lips they became swollen. There is also the case of a boy, who "if at any time he ate of an egg, his lips would swell, in his face would rise purple and black spots, and he would froth at the mouth." Some medicines affect particular persons dangerously, even when given in very minute doses: a single grain of mercury has been known to induce a profuse salivation, with destruction of the jaw-bones. On others, medicines have a peculiar effect—astringents may purge. Every summer, in this country, persons may be seen with the most distressing irritation of the nasal and palpebral mucous membranes, produced by the exhalations arising from the fields during the inflorescence of the hay crop. In others, an asthmatic condition is induced by the same cause. The air of some places has a similar influence on individuals: one gentleman was always attacked with asthma if he slept in the town of Kilkenny, and another rarely escaped a fit of that complaint, if he slept anywhere else.

The most remarkable antipathies are those affecting the special senses. Nearly all persons have a loathing at reptiles, but some few *faint* on seeing a toad or lizard, others on seeing insects. "The duke d'Epéron swooned at sight of a leveret—a hare did not produce the same effect. Tycho Brahé fainted at sight of a fox, Henry III. of France at that of a cat, and Marshal d'Albert at a pig."—*Millögen*.

Hearing a wet finger drawn on glass, the grinding of knives, or a creaking wheel, is sufficient to produce fainting in some. *Smelling* musk or ambergris throws some into convulsions; and we have seen how articles of food affect others—often, no doubt, owing to perverted taste. The *touch* of anything unusually smooth has the same effect sometimes. Zimmerman records the case of a lady who was thus affected by the feeling of silk, satin, or the velvety skin of a peach.—This subject is also noticed under IDIOSYNCRASY.

ANTIPHLOGISTIC (Gr. *anti*, against, and *phlego*, I burn), a term applied to remedies, and also to regimen, that are opposed to inflammation; such as blood-letting, purgatives, low diet, &c. See ANTIPYRINE; FEBRIFUGE; FEVER.

AN TIPHON, the earliest of the 10 Attic orators in the Alexandrine canon, was the son of Sophilus the Sophist, and b. at Rhamnus in Attica 480 B.C. In his youth, the reputation of Gorgias, the most showy and insincere of all the Greek rhetoricians, was at its height. A. soon became convinced of the worthlessness of that oratory which the fashion of the time so highly valued, and resolved to introduce a new and better kind. He labored to make his arguments clear, solid, and convincing, so that it might be impossible for the judges who listened to the speeches he wrote to refuse their assent to his propositions. His success was unmistakable. Although he never made a public appearance as a pleader in the courts of justice, but contented himself with writing speeches for others to deliver, he acquired great influence, which he did not fail to exert for the furtherance of his political principles. To him must be attributed the overthrow of the Athenian democracy (411 B.C.), and the establishment of the oligarchical government of the Four Hundred; for although Pisander figured prominently before the people in this revolution, the whole affair, according to Thucydides—one of A.'s pupils in oratory, and a man admirably fitted to judge of such a point—was secretly planned by him. The oligarchical government did not prosper. Dissensions quickly broke out among the Four Hundred, and six months after, Alcibiades, the brilliant demagogue, was recalled. A. was brought to trial for treason, in having attempted to negotiate peace with Sparta. He is said to have made a noble defence of himself. Thucydides affirms that an abler was never made by any man in a similar position. It was his first and last oration. He was condemned to death; his property was confiscated, his house razed to the ground, his remains forbidden interment in Attica, and his children forever declared incapable of enjoying civic privileges. Of the 60 orations of A. which the ancients possessed, only 15 have come down to us. Three of these are written for others, and are greatly admired for their clearness, purity, and vigor of expression; the remaining 12 appear to have been intended as specimens of school-rhetoric for his pupils.

ANTIPH'ONY, a name given by the ancient Greeks to a species of musical accompaniment in the octave, by instruments or voices, in opposition to that executed in unison, which they called *homophony*. A. is also the name of a species of sacred song, sung by two parties, each responding to the other; a practice which was cultivated in the early ages of the Hebrews, Greeks, and Romans. Many of the psalms of David show that antiphonal singing was then in use. Its introduction into the Greek church is ascribed to Ignatius, bishop of Antioch, in the 2d c.; and Ambrosius, bishop of Milan, is said to have introduced it into the western church, in the 4th c. The dividing of the antiphonies into verses, with rules regarding the same, is attributed to pope Celestin in 432. pope Gregory I., in 590, prepared the first regular *antiphonarium* (see *Durandi Rationale Divinorum Officiorum*, Mainz, 1469). It was early a custom, which became especially common after the 13th c., to date deeds with the beginning words of the A. (*Introitus*), which in these times served for the day of the month and of the week. The reformed Christian churches of Germany and England have still retained a certain degree of antiphonal singing. The chanting of the psalms in the English cathedral service is an imitation of the ancient antiphony.

ANTIPHRAISIS (Greek) among the ancients denoted the practise of naming words after attributes which they do not possess. In the time of Aulus Gellius (q.v.), a Roman grammarian of the second century, this theory was new, and therefore captivating. For example, some derived the word *multa* (a fine) from the adjective *multus* (much), and said that a fine was called *multa*, because it did *not* tend to make one's property *multum*. As a *theory*, indeed, antiphrasis is not unscientific nor unphilosophical, for it is based on the law of the association of ideas. The formation and variation of words by metaphor are common phenomena of language. Antiphrasis is only the reversal or negative application of the same principle. A certain object suggests a like object, and we call it by some modification of the name of its type. Many objects suggest their opposites, and *a priori* we might suppose that they would receive some modification of the name of the contrasted object. The ancient scholars would not admit, however, the truth that the theory has very limited application in the sphere of contrast, appearing only in various forms of irony or euphemism. For examples, we may cite the fact that the Black Sea was called the *Pontos Euxinos* (i.e., the *Inhospitable* Sea), though it was really *euxinos* (inhospitable). So the Furies were known as the *Eumenides* (the kindly minded ones), whereas their power was feared and dreaded. These examples illustrate the influence of euphemism. As an example of irony in antiphrasis, we find the phrase *Jeddart justice*, i.e., hanging first and trying afterwards. To sum up, antiphrasis as a theory is perfectly tenable, but undoubted instances of its application are few in number. This, however, did not deter the ancients from applying the theory to many words in whose formation it had no part whatsoever, as in the word *multa*, cited above from Gellius (XI. 1).

ANTIP'ODES, a word of Greek origin, signifying, literally, those who have their feet over against each other. As applied to geography, the term means the inhabitants of any two opposite points of the globe, or, in other words, the dwellers at the opposite extremities of any diameter of the earth. From this primary relation, there necessarily arise many secondary relations. A. must be on one and the same meridional circle, separated from each other by half the circumference. Being on one and the same meridional circle, they must differ in long. exactly 180°, with the exception of the poles themselves, as having

no longitude at all ; and being separated from each other by half the circumference, they must be equidistant from the equator in opposite directions. Take Edinburgh, as an example, in lat. $55^{\circ} 57'$ n., and long. $3^{\circ} 11'$ w. ; its A. must be in lat. $55^{\circ} 57'$ s., and in long. $183^{\circ} 11'$ w., or rather in $176^{\circ} 49'$ e.—which is merely an undistinguishable spot in the Antarctic or Southern ocean. Take, as another example, London, in lat. $51^{\circ} 30'$ n., and long. $0^{\circ} 5'$ w. Its A. must be in lat. $51^{\circ} 30'$ s., and in long. $180^{\circ} 5'$ w., or rather $179^{\circ} 55'$ e.—coinciding pretty nearly with a small island to the s.e. of New Zealand. This small island, in honor rather of London than of itself, has appropriated the term A. as its own peculiar name.

Between A. in general there necessarily exist also other secondary relations. With reference to the earth's daily rotation, the noon of the one side must be the midnight of the other ; while, with regard to its annual revolution, the summer and the autumn of the one side must be the winter and the spring of the other. With respect, however, to the former contrast, some explanation may be required. This, for instance, being Wednesday in London, was last midnight in that city the noon of Tuesday or of Wednesday at A. island ? The answer is, that according to circumstances, it may be held to be either the one or the other. In going eastward—that is, in meeting the sun—one, from day to day, anticipates every noon and every midnight in the proportion of 4' of time to 1° of long., or of 12 hours of time to 180° of long. ; so that, on reaching A. island from London by the cape of Good Hope, the middle of Tuesday night, by Greenwich reckoning, is actually regarded on the spot as the noon of Wednesday. In going westward, again—that is, in leading, as it were, the sun—one, from day to day, postpones every noon and every midnight in the same proportion as above ; so that, on reaching A. island from London by cape Horn, the middle of Tuesday night, by Greenwich reckoning, is actually regarded on the spot as the noon of Tuesday. In fact, navigators in opposite directions, meeting at any intermediate point whatever of the earth's circumference, always differ in their computation of time by a whole day, or 24 hours. In two cases, this has been permanently exemplified : the Spaniards at the Philippines, who have come from the e., are a day behind the Portuguese in Macao, who have come from the w. ; while on the n.w. coast of America, the Russians from the w. were a day in advance of the British from the e.

AN'TIPOPE was a pontiff elected in opposition to one canonically chosen. The first antipope is reputed to be Laurentius, elected 398, in opposition to Symmachus. Several emperors of Germany set up popes against those whom the Romans had elected without consulting them. Otho the great displaced successively two bishops of Rome ; and when Sylvester, III. had expelled the simoniacal and profligate pope Benedict IX., Conrad II., king of Germany, brought back this worthless pastor, who hastened to sell his dignity to Gregory VI. There were now, consequently, three popes, and their number was increased to four by the election of Clement II. in 1046. Shortly after, Alexander II. found a rival in Honorius II. ; and in 1080 the same unseemly spectacle was witnessed, when Henry IV., emperor of Germany, elevated to the papal chair Guibert of Ravenna, under the title of Clement III., in opposition to his implacable adversary, Gregory VII. But after the death of Gregory, Clement was himself opposed successively by Victor III. and Urban II., and at last died at a distance from Rome, having just beheld the exaltation of Pascal II., as the successor of Urban. During the 12th c., several antipopes flourished, such as Gregory VIII. and Honorius III. On the death of the latter, France began to intermeddle in these disgraceful strifes, and upheld the cause of Innocent II. against Anaclet ; while the kings of Sicily, on the other hand, more than once set up a pontiff of their own against the choice of the emperors. Between 1159 and 1378, there were four antipopes ; but the most remarkable epoch is “the great schism of the west,” produced by these disedifying rivalries in 1378—a schism which divided the church for 50 years. It broke out after the death of Gregory XI., at the election of Urban VI., whom the voice of the Roman people, demanding an Italian pope, and not one who should fix his pontificate, like several of his predecessors at a distance from Rome, had elevated to the papal throne. The French cardinals objected, withdrew to Provence, and elected a new pope, under the name of Clement VII., who was recognized by France, Spain, Savoy, and Scotland ; whilst Italy, Germany, England, and the whole north of Europe, supported Urban VI. These two popes excommunicated each other ; nor did they even fear to compromise their sacred character by the most cruel outrages and the most odious insults. The schism continued after their death, when three popes were elected by different parties, all of whom were deposed by the council of Constance, in 1415, and Cardinal Colonna elected in their room, under the title of Martin V. The last antipope was Clement VIII. With him the schism ceased. These divisions are often alleged as an argument against the doctrine of papal infallibility ; but Catholics consistently affirm that the privilege of infallibility is only claimed in matters of doctrine, and has no relation to questions of fact, such as disputed succession, or canonicity of election.

ANTIPYRINE. An artificial alkaloid, having the chemical formula $C_{11} H_{12} N_2 O$. Its proper name is demethyl-oxy-chinicin.

PROPERTIES, PHYSICAL AND CHEMICAL.—A white crystalline powder, freely soluble in water and alcohol, having a characteristic and unpleasant taste. It should not be given with sweet spirits of nitre, as the green precipitate thus formed is an inert compound of antipyrine.

PHYSIOLOGICAL ACTIONS.—It diminishes the force and frequency of the heart's action and lowers the arterial tension. It reduces the frequency of respiration and the amount of CO_2 given off. It diminishes the amount of urine, of urea, and probably of uric acid. In consequence of this decrease in the oxidation processes of the body, heat production is lessened, and the bodily temperature falls. Frequently this is accompanied by a profuse perspiration, which accentuates the fall of temperature. Antipyrine tends to allay nervous irritability and to relieve pain. It sometimes forms methæmoglobin in the blood.

THERAPEUTIC USES.—1. *As an antipyretic.* It is prompt, and as a rule very efficient. The fall of temperature begins in half an hour, usually, and the lowered temperature lasts for a few hours or even a day. The fall is usually through several degrees and sometimes below normal. It is generally accompanied by sweating and occasionally by signs of heart failure. The dose for adults is 10–20 grains, to be repeated when the temperature rises to 103–104° F.

2. *As an analgesic.* Here also it is prompt and efficacious. It has proved of great value in all varieties of neuralgia, both superficial and visceral; in all forms of headache; in dysmenorrhœa and for the relief of labor-pains. It is of course more serviceable when these conditions are of functional origin and not organic.

3. *As an antiperiodic.* Of no value. It reduces the temperature of any one paroxysm, but has no permanent effect on the course of the disease.

4. *For rheumatism.* It is frequently very useful, resembling in its action salicylic acid. It lessens the severity of an attack, but seems to have no influence in diminishing the liability to heart complications.

5. *As a nervous sedative.* It is worthless in epilepsy and of doubtful utility in chorea. In whooping cough it often abates the frequency and severity of the paroxysms, but does not seem to shorten the course of the disease.

6. *As a hypnotic.* It seems to be of some use in painful or febrile affections.

7. *As a hæmostatic.* It is efficient both locally in powder or solution and also internally.

8. *As an antiseptic.* It is of some value. It is a good stimulant to indolent ulcers when applied in powder. Besides these, it has been used in every condition and lesion known to man, and some have improved during its continuance.

UNUSUAL EFFECTS.—Antipyrine frequently produces untoward symptoms. These may be grouped under:

1. *Circulatory.* Cyanosis, frequent and feeble heart-action, and dyspnoea, sometimes amounting to collapse, occur not uncommonly. Serious symptoms have been produced by 10 or 15 grains, and even death has been caused. This must be remembered, especially in cases where the natural tendency of the disease is toward heart-weakness. In these cases it is very advisable to give some stimulant, such as a full dose of brandy or whiskey, with the antipyrine. If it has to be given frequently, great care must be used, as a cumulative action has been noticed in several cases. The dose which is at first safe may become poisonous if repeated several times in a day. Individual susceptibility varies greatly.

2. *Cutaneous.* Among the rashes noticed are some which resemble measles, scarlatina, urticaria, erythema, and purpura. These are unpleasant, but not serious.

3. *Nervous.* These include various paræthesiæ, vesical spasms, cramps. These are not usually serious.

ADMINISTRATION.—It may be given orally in pill or powder or dissolved in water or some form of alcohol. The usual initial dose is 10 grains, which may be increased as the individual susceptibility is determined. Children take larger doses in proportion than adults. The average dose for a child may be considered one grain for each year up to ten. For hypodermic use, the drug is best given in 2 or 3 parts of water, to each dose of which $\frac{1}{2}$ grain of cocaine hydrochlorate has been added. This prevents the decided pain which is otherwise present.

ANTIQUARIES, SOCIETY OF. Under this name, associations of learned men, established for the exclusive purpose of cultivating the study of antiquities, exist in the principal countries of Europe and in America—at London, Edinburgh, Paris, Rome, Vienna, Copenhagen, etc. The London Society of A. received its charter in 1751, but had commenced its meetings as early as 1707; minutes began to be kept in 1718. Long previous to this, in 1572, an antiquarian society was established by Archbishop Parker and Sir Robert Cotton. It was dissolved about 1604 by King James, who regarded the inquiries of the A. with suspicion. The present "society of A. of London" consists of a president, a council of 21, and several hundred fellows. It has published a number of valuable works, among the most interesting of which is a series of Anglo-Saxon and early English literary remains. The Scottish society of A. was founded in 1780. The American Antiquarian Society, founded in 1812, has its headquarters at Worcester, Mass.

ANTIQUÉ. As the term ancients is commonly applied to the Greeks and Romans, the word A. is used with reference to their works of art, especially their incomparable sculptures. The A. style in works of art is distinguished by critics from the romantic or mediæval, and also from the modern. The sculpture of the Greeks is characterized by freshness, originality, and ideality; and the phases it underwent have their parallels in the development of the literature and general culture of that people. In the earliest

times the statues had a rigid, formal character, and looked more like the idols of barbarous nations than deities in human form; then came stern, Titan-like forms, corresponding with the Prometheus of Æschylus; next the sculptures of Phidias, Polycletes, and Polygnotus—like the characters in the dramas of Sophocles—present to us humanity in its purest and noblest ideal forms. Then, as Euripides in poetry left the old domain of destiny, and derived motives and action from ordinary human passions, so statuary descended from the ideal to a closer resemblance to the forms of actual life; as we see in the works of Praxiteles and Lysippus. Afterwards, when Aristophanes introduced comedy, forms of every-day life began to appear in sculpture; and thus a gradual transition was made from the art of the Greeks, which was ideal, in the true sense of the word, to that of the Romans, which was real, monumental, and portrait-like. The Romans were the realists of the ancient world; their indigenous philosophy was of a popular kind; their poetry, so far as it was national, was satire; and their works of art may be regarded as monuments and portraits of real life, quite suitable for a nation of soldiers, lawyers, and politicians, but vastly inferior to the ideal beauty displayed in the best period of Grecian art.

ANTIQUITIES. See ARCHÆOLOGY.

ANTI-RENTERS, a political party, which, in the four years between 1843 and 1847, made much commotion in that part of the state of New York comprised in the counties of Albany, Columbia, Delaware, Greene, and Rensselaer. In these counties land had been royally granted in the old colonial times to "lords of the manor," who were usually called "patroons." The tracts of land so granted were enormous in extent, and they had made leases in perpetuity, with the ground-rent payable generally in "kind," in corn, grain, skins of animals, and products of the soil or chase. As civilization extended and population increased, such a possession of their lands by tenants in this nature of feudal possession grew irksome to them. While nominally owning their farms they were not the real owners. From complaining, the tenants turned to resisting, and especially upon farms which were handed down through families from generation to generation, until finally the tenants in those counties which have been named banded themselves in associations, in order to attempt to break their leases. Their appeals to the law courts were, however, ineffectual. Then the question entered into the domain of politics, as it has similarly entered in Ireland and England. Great meetings were held in these counties. Agitators who had no particular interest in the anti-rent questions, as well as tenants who had the greatest interest, organized and addressed these meetings, at which there was more or less "sedition" and much rash talking, perhaps natural under the circumstances. Sometimes tenants would refuse to pay even a nominal rent or to recognize the "landlordism" in their cases, and then, of course, resort would be had to the courts for eviction procedures, to which there would be resistance. From legal resistance the tenants went on to armed and belligerent resistance. They would dress like Indians and disguise their faces with paints, and then seize the deputy-sheriffs, who came to serve processes of eviction, and tar and feather them. In one or two instances extreme violence was resorted to, and all this resistance led to the passage of a statute against men appearing in public in disguise.

During the summer of 1845 some alarming outrages were committed by "Indians" of the anti-rent associations in Columbia county, and the law to prevent people appearing disguised and armed did not have the effect to prevent the outrages. A deputy-sheriff was shot at and wounded. Dr. Boughton, one of the most active agents in exciting these disturbances, was arrested and brought to trial, but the jury would not agree to convict him. On a second trial, however, Boughton, or "Big Thunder," was convicted and sentenced to the state prison. In Delaware and Schoharie counties frequent riots occurred, and finally, Aug. 7, Mr. Steel, a deputy-sheriff, while engaged in the discharge of his official duties, was attacked by an armed party and murdered in the open daylight. Then martial law was proclaimed in the district; several persons were convicted and sent to the state prison, and two were sentenced to be hanged. The death penalty was afterwards commuted by governor Wright for confinement in the state prison for life, and eventually, when the troubles were all ended, they were released. It was two or more years later before the disturbances were suppressed; and, when order was restored, Gov. Wright recommended for the relief of the tenantry: 1, that distress for rent accruing on all leases executed in future should be abolished; 2, taxing the landlord for his income by means of rent; 3, that the duration of the time of all leases to be executed should be restricted to 5 or 10 years. Soon afterwards the legislature acted upon the first of these recommendations; the landlords entered more or less into compositions, and the constitution of 1846 forbade agricultural leases in which were reserved rent or service of any kind during a longer term than 12 years. The A.-R. quickly merged into the great political parties of the period.

ANTIRRHINUM. See SNAPDRAGON.

ANTI-SABBATARIANS, those who recognize no obligations to observe either the Jewish Sabbath, or the Christian Lord's day, deeming one day as sacred as another.

ANTISANA, a volcanic peak of the Andes, in Ecuador, 35 m. s.e. from Quito ; 19,279 ft. high. There have been no eruptions for many years. On the side of A. is lake Mica, near which is a hamlet, which is one of the highest inhabited places on the earth, variously reckoned at 13,300 to 13,465 ft. above sea-level.

ANTISCORBU TICS. See **SCURVY**.

ANTI-SEMITIC PARTY. Anti-Semitic is a term applied to a political movement in Germany against the Jews, which originated in Berlin in 1879. In many respects a remarkable movement, it is in nothing more so than in the character of its leaders. Adolphus Stoeckler, preacher at the court of Prussia and the founder of the Christian Socialists, was the first to formulate the popular discontent into a political scheme. Others equally celebrated soon associated themselves with him, among them Prof. Treitschke of the University of Berlin, publicist, historian, and deputy in the Reichstag and Dr. Dühring, author of learned treatises in science, history, and philosophy.

Through the press, in public speeches and brochure after brochure these men ably deplored during the winter of 1879-80 the "Jewish invasion of German society." They saw in the Israelites of Germany an active, wealthy, powerful people, absolutely incapable of assimilation, "a people within a people," "a state within a state," a constant menace to Christian civilization in all its phases—social, economic, political, juridical, and religious. "Let us not be deceived," said Treitschke, "the movement is a strong and deep one even in the highest and most cultivated circles, among men furthest removed from every thought of religious intolerance or national pride. There is now but one sentiment in that quarter. The Jews are our curse."

In 1880 the Anti-Semites addressed a petition to Bismarck for the "deliverance of the German people from the Jews, who are becoming masters little by little without ever having taken the least part in the national work." The matter was brought before the Reichstag, where a vote was taken in November. It declared itself on the side of economic and religious liberty, and therefore against any change in the existing laws. This decision has not yet been, nor is it likely soon to be, reversed.

In Austria and Hungary, whither the agitation quickly traveled, it was attended by many disgraceful cruelties, owing to the fact, no doubt, that the Jews are there much more numerous and hold mortgages on nearly all the small landed properties. The trial of the Jew, Tisza Eszlar, in 1882, charged with murdering a young man in order to use his blood for religious rites was the signal for a general outbreak, in the course of which Zala-Egerzeg was sacked and many Jews butchered. At the election of 1887 another outbreak occurred, and the Jewish quarter of Szerdahely was burned to the ground. Again, in 1889, the shops of the Jews were plundered by the mob in Vienna itself, where the municipal elections had proved a signal triumph for the Anti-Semites.

An attempt has been made to create an anti-Semitic sentiment in France. M. Edouard Drumont, a French author of some note, published in 1886 a two-volume work, *La France Juive*, in which he called attention to the dangers threatening society from the Jews and urged immediate action against them. It has had little effect. France has yet to be persuaded that she has a Jewish question.

ANTISEPTICS are substances which arrest the putrefactive changes that dead vegetable and animal matter is liable to undergo when exposed to air, warmth, and moisture. A. are therefore anti-putrescents; and the term itself indicates the office which the members of the class fulfill (*anti*, against, and *septikos*, putrefactive). The theory of the action of all A. is, that one or two of the three indispensable conditions of putrefaction—viz., 1, a moderate *warmth*, 2, access to air, and 3, moisture—are arrested or neutralized. Thus, in the preservation of fish in stores or during transport by railway, they are packed in barrels with ice, which keeps down the temperature; and though air and moisture gain admittance, yet the putrefactive processes cannot proceed. The same preservative power of cold is observed naturally in the discovery of remains of elephants and other animals imbedded in the ice of the polar regions, and which doubtless have been locked up there for ages. In a less degree, the influence of cold as an antiseptic is observed in the longer time that meat, eggs, and other animal matters keep fresh in winter than in summer.

Again, warmth and moisture may be present, but if the air be excluded, putrefaction does not go on. The ordinary mode of preparing *preserved meats* affords the best illustration of this point. The substance to be preserved is placed in a tin dish covered over, and leaving a very small opening. When the can with its contents is heated, the air which fills up the pores of the solids, and is dissolved in the liquids, is driven off, and escaping by the aperture in the cover of the dish, leaves the contents devoid of air. If the opening be now closed with solder, the air is kept from returning; and whatever climate the can of preserved meat be sent to, yet so long as the tin casing remains good, and refuses to admit the air, so long will the contents continue wholesome and palatable. The common plan of preserving eggs by rubbing over the shell with tallow or oil, is founded on the principle of filling up the pores of the shell, so as to deny the admission of the air. Moisture is likewise necessary for the process of putrefaction. Thus, if the contents of an egg be thrown out on a plate, and thoroughly dried in an oven, the whole becomes of a hard, horny consistence, and may be kept in this state for years without exhibiting the slightest symp-

tom of passing into a putrescent or rotten condition. In the same way meat may be kept quite fresh by depriving it of moisture. Eggs dried up in this manner require only to be soaked in cold water, and then boiled, when they will present themselves in a condition hardly differing in flavor and taste from an ordinary boiled egg.

The more important chemical A. are—alcohol, wood-spirit, creosote, pitch-oil, coke-oil, sugar, tannic acid, sulphurous acid, common salt, nitre, alum, chloride of zinc, sulphate of copper (blue vitriol), corrosive sublimate, arsenic.

The manner in which these A. act is very different.—1. Sulphurous acid acts by combining with the oxygen, and thereby deoxidizing the substance. 2. Sirup of sugar acts by combining with the water of the substance to be preserved. 3. Creosote, tannic acid, alum, chloride of zinc, sulphate of copper, corrosive sublimate, and arsenic, are useful in forming compounds with the organic matter, which are not so liable to become putrescent as the uncombined organic substance. 4. Alcohol, wood-spirit, common salt and nitre, act in a double way, by combining with the water of the putrescible substance, and by combining with the substance itself, so as to form a more durable compound.

Some of the more important uses to which the chemical A. are applied are—1. In the preservation of anatomical specimens, where alcohol, and less often, chloride of zinc, are the agents; 2. In the curing of herring and other fish, where common salt is generally used; 3. In preparing corned or salted meat and tongues, where common salt and nitre are jointly employed; and, 4. In the manufacture of size for writing-papers, where the paper-maker uses sulphite of soda or antichlore (containing sulphurous acid) to arrest the decomposition of the scraps of hides used in the manufacture of size. In the preservation of timber, A. are also taken advantage of. The wood is placed in a steam-box, and the air contained in its pores being replaced by steam, the whole casing is closed tight, and allowed to cool, when the steam condenses, and leaves a vacuum in and around the block of wood. On the introduction thereafter of one of the A., it finds its way into the innermost pores of the timber. Wood thus prepared is less liable to decay than ordinary; and the A. seem not only to withdraw water, and form durable compounds, but to offer a poisonous dose to minute plants and animals which house themselves in the wood. The use of sulphate of copper for this purpose was suggested by Bonchardat; of corrosive sublimate, by Kyan (hence the process was called *kyanizing*); and of chloride of zinc, by Sir W. Burnett (hence the term *burnettizing*). See also CARBOLIC ACID, and Condy's fluid under MANGANESE.

Another valuable application of antiseptic substances is that which employs them in the prevention of infectious diseases. Infectious matter can either be absolutely destroyed or rendered harmless and inert by processes of antisepticism, i.e., by the use of antiseptics or by exposure to a higher degree of heat. Whatever comes from the vicinity of a patient suffering from an infectious disorder can be antiseptized by the use of chloride of zinc, carbolic acid, corrosive sublimate, etc., while the sick-room is treated by fumigation with sulphurous acid or chlorine. Care should be taken not to confound deodorizers (q.v.) with disinfectants or antiseptics. See DISINFECTANTS. The use of odoriferous fumigants, such as ordinary pastilles, lavender, amber, etc., is of no avail at all for disinfecting purposes, and is even dangerous, in that it leads one to neglect the warning of dangers often given through the presence of the odors that accompany infectious matter.

The application to surgery of the discoveries embodied in the germ theory of disease (q.v.), has in large measure revolutionized the methods of surgical treatment. ANTISEPTIC SURGERY or LISTERISM, perhaps better called ASEPTIC SURGERY, may be regarded as established by the distinguished English surgeon, Sir Joseph Lister, since 1877 Professor of Clinical Surgery at King's College Hospital, London, surgeon-extraordinary to the queen, and in 1888 made a baronet in recognition of the great value of his discoveries. He was among the first to recognize and set forth publicly in his lectures the now universally accepted fact that *sepsis*, or putrefactive process, is the chief danger that meets the surgeon in treating wounds, whether surgical or accidental. His system is, in brief, the exclusion of the microbes that induce the processes of fermentation, or the eradication of those microbes after they have gained access to the wound. This is done by the use of germicides, among which the most important are carbolic acid (in solution or in the form of a spray), perchloride of mercury (corrosive sublimate), iodoform, chlorin-water, thymol, boric acid, aqueous solution of bromine, eucalyptus oil, and salicylic acid.

The use of perchloride of mercury was first advocated by Drs. Bergmann and Robert Koch (q.v.), who advised its employment in an aqueous solution of 1 to 1000. This antiseptic is employed in conjunction with carbolic acid (q.v.) to destroy the microbes of disease in the immediate vicinity of the wound. All objects near the wound are to be kept thoroughly purified and "surgically clean," as are the hands and instruments of the operator and his assistants. During the operation, the wound and its neighborhood are kept continually moistened with the antiseptic solution. After the operation, the closed wound is covered with a layer of oil-silk to prevent irritation from the antiseptic dressing. This dressing is of muslin impregnated with carbolic acid, resin, and paraffine; or iodoform gauze may be used. The dressing is often replaced by fine cotton batting treated with corrosive sublimate, or some other antiseptic. This is fastened by bandages. This dressing is usually retained until the discharge from the wound makes itself visible.

In changing the dressing, the same precautions to avoid sepsis are taken as at the time of the original operation.

Wounds not caused by the surgeon are washed out with a solution of carbolic acid (1 to 20) or corrosive sublimate (1 to 500) and are then treated like surgical wounds. Asepsis can hardly be thoroughly attained after an exposure to putrefactive causes for a period of 36 to 48 hours. In large wounds, when there is apt to be an accumulation of discharge, the *drainage tube* invented by the French surgeon, Chassaignac, is an indispensable adjunct. This is usually of india-rubber, from $\frac{1}{8}$ to $\frac{3}{8}$ of an inch in diameter, and perforated with numerous holes. It is introduced so that one end is on a level with the skin and projects above it; while the other end is in communication with the seat of the discharge, which it allows to escape constantly, thus diminishing alike the chemical and the mechanical irritation.

The introduction of antiseptic and aseptic methods into modern surgery has greatly reduced the mortality in hospitals, where formerly pyæmia (q. v.), septicæmia, and gangrene were frightfully common. Prof. Volkman, of Halle, was at one time about to close his wards because of the prevalence of these scourges, but having tried the antiseptic treatment, he found the total mortality of the wards reduced to less than six per cent. The other advantages to be derived from the method of Lister are no less marked, namely, the absence of putrid odors, the diminution of pain in the wound, and the averting of the fever that formerly followed. See Cheyne, *Antiseptic Surgery* (1882); Jeannel, *De l'Infection Purulente*; Gerster, *Aseptic and Antiseptic Surgery* (1888); a valuable article by Dr. Roswell Park, on "Antiseptics," in *Wood's Reference Handbook of the Medical Sciences* (1885); and the articles BACTERIUM, MICROBE, KOCH, PASTEUR.

ANTI-SLAVERY SOCIETY, THE AMERICAN, organized in Philadelphia, Dec., 1833, by delegates from the few state or city societies in the United States. The first A. S. was formally organized in Boston, Jan. 6, 1832, William Lloyd Garrison being the leader of the movement. The American A. S. took the boldest ground in favor of the abolition of slavery, and its work was for many years looked upon as fanatical, or at least hopelessly impracticable. The presidents were Arthur Tappan, Lindley Coates, William Lloyd Garrison, and Wendell Phillips, and among its minor officers and most active friends were Beriah Green, John G. Whittier, Oliver Johnson, Lucretia Mott, Abby Kelley Foster, Gerrit Smith, Charles C. Burleigh, Samuel J. May, Francis Jackson, and William Jay. For many years the members of the society were denounced by almost every press in the country; their meetings were broken up by violence, and rewards were offered, in the south, for the assassination of their leaders. But the A. S. was both zealous and persistent, and many of its earliest members lived to find in the adoption of the 13th amendment to the national constitution, a proper time for its formal disbandment, which took place April 9, 1870. See SLAVERY.

ANTISPASMODICS. See SPASM.

ANTISTHENES, founder of the Cynic school of philosophy, was the son of A., an Athenian. The date of his birth is not known, but he fought in his youth at Tanagra (426 B. C.), and he survived the battle of Leuctra (371 B. C.), and died at Athens at the age of 70. After listening to the teaching of Socrates, he gave up the profession of rhetoric, which he had followed at first as a disciple of Gorgias, in order to apply himself wholly to the study of moral philosophy. He was present at the death of Socrates, and never forgave his persecutors.

ANTI STROPHE, a stanza or portion of a poem following the strophe, and responding to it. Or when the same word or phrase is used both at the beginning and end of a clause or sentence; as,

"Fare thee well; and if forever,
Still forever fare thee well."

ANTITHESIS. See RHETORIC, FIGURES OF.

ANTI-TRADE WINDS, winds extending from the trade-wind region to a point near the poles. These winds are very variable, but their general direction is toward the poles. In the northern regions, southwest currents of air prevail, called the *South West Anti-Trades*, whereas in the Southern regions, the prevalent winds are from the Northwest, forming the *North West Anti-Trades*. See Trade-Winds under WIND. The Anti-Trade winds are so named because they blow in a direction opposite to the course of the trade-winds.

ANTITRINITARIAN, one who denies the doctrine of the Trinity. An A. differs from a Unitarian only in this respect, that his objection to the doctrine in question is made on philosophical, while that of the latter is made on theological grounds. A Unitarian is one who accepts the Bible as inspired, but does not find in it the doctrine of the Trinity; an A. is, or may be, a philosophical theist, who denies the inspiration of scripture.

ANTIUM, one of the most ancient cities of Latium, stood on the coast 34 m. s.s.e. from Rome. Being favorably situated for commerce and piracy, it became, under the Volscians, into whose hands it had fallen, one of the most powerful enemies of rising Rome, until finally subdued (338 B. C.). It became a favorite resort of the wealthy Romans, and some of the most famous remains of ancient art have been discovered among the ruins of their villas and palaces; such as the Apollo Belvedere, and the Borghese Gladiator. It was the birthplace of the emperors Caligula and Nero; and the latter

constructed a splendid port by means of two moles enclosing a basin 2 m. in circumference. Remains of the moles still exist, although the basin is mostly filled up with sand.

ANTIVARI, a seaport of Montenegro, set off from Albania, 1878, by the treaty of Berlin. It is about 18 m. n.w. of Scutari; has an excellent harbor not accessible to vessels of war. Pop. about 8000.

ANT-LION, the larva of an insect (*myrmeleon formicarium*) of the order neuroptera, remarkable for its habits, which have been carefully observed by some of the ablest naturalists of Europe. It inhabits sandy districts, is not known in Britain, and is more common in the south of Europe than in the north. The perfect insect is about an inch long, and has a considerable general resemblance to a dragon-fly. The larva is rather more than half an inch long; it has a very large abdomen, and a small head, which, however, is furnished with two very large incurved mandibles. It has six legs, but is incapable of rapid locomotion, and generally moves backwards. It feeds upon the juices of insects, particularly of ants, in order to obtain which it excavates with the greatest ingenuity a funnel-shaped hole in sandy ground, and lies in wait at the bottom, all but its mandibles buried in the sand. Insects which approach too near to the edge of the hole then become its prey, by the loose sand giving way, so that they fall down the steep slope. If they do not fall quite to the bottom, but begin to scramble up again, the A. throws sand upon them by jerking its head, and so brings them back. It employs its head in the same way to eject their bodies from its pit, after their juices have been sucked, and casts them to a considerable distance; and by the same means throws away the sand in excavating its hole, first plowing it up with its body, and then placing it upon its head by means of one of its fore-legs. It always begins by working round the circular circumference of its future hole, and gradually narrows and deepens it; turning quite round after each time that it works round the hole, so as to employ next time the fore-leg of the other side. When it meets with a stone which it cannot remove, it deserts the excavation, and begins another. The pit, when completed, is usually about 30 in. in diameter by 2 in. depth. Some species are common in North America. See *illus., BEETLES, ETC., vol. II.*

ANTOFAGASTA, a port in the Chilian department of the same name. Founded in 1870, it increased rapidly in importance owing to the saltpetre deposits in the neighborhood and to the rich mines of Caracoles with which it is connected by railway. It was taken from Bolivia by Chili in 1879. Its population is about 7600.

ANTOMMAR'CHI, FRANCESCO, a well-known physician and memoir writer, a native of Corsica, was born about 1780. He owes his celebrity almost entirely to his intimacy with Napoleon Bonaparte during the exile of the latter in St. Helena. In 1818, he was induced to leave Florence, where he held the office of anatomical dissector in the hospital of Santa Maria Nuova of Florence, and to become private physician to the banished emperor. There was at first little cordiality between the two; but subsequently Bonaparte conceived a high regard for his countryman, and at his death left him 100,000 francs. In 1821, A. returned to Europe, and in 1826 published at Paris *Les Derniers Moments de Napoleon*, a work which has been very extensively read. He now became involved in a dispute with the heirs of Mascagni—his old anatomical professor—regarding certain anatomical plates which he announced as on the eve of publication. The heirs affirmed that A.'s lithographed drawings were mere copies from the plates of Mascagni, and the controversy went on briskly for some time, till Paris grew tired of it, when it gradually died away and was forgotten. On the breaking out of the Polish revolution, A. departed for Warsaw, where he received the appointment of general inspector of military hospitals. He soon returned to Paris, where he published a cast of Napoleon's head, which he affirmed to have taken when the emperor was on his death-bed. This declaration again involved him in a hot dispute with the phrenologists, who were not satisfied with the conformation of the cranium, and therefore cast suspicions—some of them apparently not altogether ill founded—on the veracity of A.'s statements. Harassed by the attacks of his adversaries, and sick of further controversy, A., about 1836, resolved to emigrate to America. He d. at San Antonio, in Cuba, in 1838.

ANTONEL'LI, GIACOMO, a distinguished cardinal, was b. on the 2d of April, 1806, at Sonnino, a village situated near the Pontine marshes. His father, a wood-cutter, sent A. to be educated at the grand seminary of Rome, where he proved himself one of the cleverest students of his time. He gained the favor of the late pope Gregory XVI., who named him a *prelato*, and gave him some excellent ecclesiastical appointments. In 1841, A. became under-secretary of state to the ministry of the interior; in 1844, second treasurer; and in the following year, finance minister of the two apostolic chambers. Pope Pius IX. having mounted the papal throne in 1846, raised A., during the next year, to the dignity of cardinal-deacon of St. Agatha alla Suburra. In 1848, A. was president and minister of foreign affairs in a liberal cabinet, which framed the famous *statuto* or constitution, proclaimed in 1848, the principal articles of which were so very soon eluded. In the oecumenical council, which began its sittings in 1869, A. showed great tact and ability in restraining the zeal and impetuosity of his impulsive master. He d. in 1876.

ANTONEL'LO, of Messina, a painter who holds a prominent position in the history of Italian art, was b. probably about 1414, in Sicily. In his day, the paintings of

Johann van Eyck, of Flanders enjoyed a wide celebrity, and several specimens were brought to Naples, where A. saw one of them. Admiring the new style of oil-painting, he traveled into Flanders, and learned the secrets of the art from Van Eyck. Afterwards, he settled in Venice, and was the first Italian who painted in oil-colors, in which he gave instructions to many artists. He d. probably in 1493. His works are now rather scarce. One, in the museum at Berlin, bears the date 1445.

ANTO'NIDES, HANS (Jan Van der Goes), 1647-84; a Dutch poet. He was of humble origin, educated at the expense of one of the lords of the admiralty at Amsterdam, and received the degree of doctor of physic. He is best known by his poems and a tragedy written at the age of 19, called *Trazil, or the Conquest of China*. His fame was fully established by *Y-Stroom*, an epic on the river Y.

ANTONI'NUS, MARCUS AURELIUS, the son of Annius Verus and Domitia Calvilla, was b. at Rome on the 20th of April, 121 A.D. His original name was Marcus Annius Verus. On the death of his father, he was adopted by his grandfather, who spared no pains to render him pre-eminent in every art and science. His fine qualities early attracted the notice of the emperor Hadrian, who used to term him not *Verus*, but *Verissimus*, and who conferred high honors on him, even while a child. When only 17 years of age, he was adopted, along with Lucius C. Commodus, by Antoninus Pius, the successor of Hadrian, and Faustina, the daughter of Pius, was selected for his wife. In the year 140 A.D. he was made consul; and from this period to the death of Pius, in 161 A.D., he continued to discharge the duties of his various offices with the greatest promptitude and fidelity. The relation which subsisted between him and the emperor was of the warmest and most familiar kind. On his accession to the throne he strikingly illustrated the magnanimity of his character, by voluntarily sharing the government (which Pius had left in his last moments, and the senate offered to him *alone*) with young Commodus, who henceforth bore the name of Lucius Aurelius Verus, and to whom he gave his daughter Lucilla in marriage. Towards the close of 161 A.D., the Parthian war broke out, and Lucius, a young man of vigorous bodily habits, was sent to the frontiers of the empire to repel the incursions of the barbarians; but intoxicated with the enervating pleasures of the east, he obstinately refused to go beyond Antioch, and intrusted the command of the army to his lieutenant Cassius, who gained several brilliant victories. Lucius returned to Rome (166 A.D.), and enjoyed a triumph to which he had no real claim; for all the great achievements of the war were accomplished by his officers, while he was reveling in the most extravagant licentiousness. In the meantime, Marcus Aurelius had distinguished himself by the prudence and energy with which he administered affairs at home. A formidable insurrection had long been preparing in the German provinces; the Britons were on the point of revolt, and the Catti waiting for an opportunity to devastate the Rhenish provinces. Within Rome itself raged a pestilence, believed to have been brought home by the troops of Lucius; frightful inundations and earthquakes had laid large portions of the city in ruins, destroyed the granaries in which were kept the supplies of corn and thus created almost universal distress, which stimulated to an incalculable degree the terror which the citizens entertained of their savage enemies. To allay the popular perturbation, Marcus resolved to go forth to the war himself. Hecatombs were offered to the offended gods, and the Roman legions set out for the north. Marcus and Lucius were, for the time, completely successful. The pride of the Marcomanni, and the other rebellious tribes inhabiting the country between Illyria and the sources of the Danube was humbled, and they were compelled to sue for peace in 168 A.D.; in the year after which Lucius died. The contest was renewed in 170 A.D., and may be said to have continued with intermission during the whole life of the emperor. Although fond of peace, both from natural disposition and philosophic culture, he displayed the sternest vigor in suppressing the revolts of the barbarians; but in order to accomplish this, he had to enroll amongst his soldiery vast numbers of gladiators and slaves, for his army had been thinned by the ravages of the plague. His head-quarters were Pannonia, out of which he drove the Marcomanni, whom he subsequently all but annihilated in crossing the Danube. The same that befell the Jazyges; but the most famous as well as the most extraordinary of all his victories was the miraculous one gained over the Quadi, (174 A.D.), and which gave rise to copious discussion amongst Christian historians and others. Don Cassius's account is that the Romans were perishing of thirst in the heat of summer, when suddenly the cloudless sky darkened, and abundant showers fell, of which the soldiers were taking advantage when the barbarians attacked, and would have cut them to pieces, if a storm of hail and fire had not descended on the former. That some extraordinary phenomenon occurred is evident, for there is a letter of Aurelius still extant in which he commemorates the event; and the emperor was a man incapable of uttering a falsehood, not to mention that there was an entire army living to disprove the statement if untrue. The effect of this remarkable victory was instantaneously and widely felt. The Germanic tribes hurried from all quarters to make their submission and obtain clemency; but the practical advantages that might have resulted from it were nullified by a new outbreak in the east, occasioned through the infamous treachery of his own wife, which demanded his presence; and though suffering from failing health, he was obliged to leave Pannonia. Before his departure, however, he learned that the ambitious governor, Avidius Cassius, who had rebelled against him, and seized the whole of

Asia Minor, had perished by assassination. The conduct of Marcus Aurelius on hearing of his enemy's death was worthy of the sublime virtue of his character. He lamented that the fates had not granted him his fondest wish—to have freely pardoned the man who had so basely conspired against his happiness. Like Cæsar in similar circumstances, but in a more purely humane spirit, he received the head of his murdered adversary with quite opposite feelings to what had been anticipated, rejecting the bloody gift with all the loathing of a benevolent nature, and even shrinking from the presence of the murderers. On his arrival in the east, he exhibited the same illustrious magnanimity. He burned the papers of Cassius, without reading them, so that he might not be at liberty to suspect any as traitors; treated the provinces which had rebelled with extreme gentleness; disarmed the enmity and dispelled the fears of the nobles who had openly favored his insurgent lieutenant. While pursuing his work of restoring tranquillity, Faustina died in an obscure village at the foot of Mt. Taurus; and her husband (and this was perhaps the single frailty of his character), though undoubtedly conscious of her glaring profligacy and infidelity, paid the most lavish honors to her memory.

On his way home, he visited lower Egypt and Greece, displaying everywhere the noblest solicitude for the welfare of his vast empire, and drawing forth from his subjects, who were astonished at his goodness, sentiments of the profoundest admiration and regard. At Athens, which this imperial pagan philosopher must have venerated as a pious Jew did the city of Jerusalem, he showed a catholicity of intellect worthy of his great heart, by founding chairs of philosophy for each of the four chief sects—Platonic, Stoic, Peripatetic, and Epicurean. No man ever labored more earnestly to make that heathen faith which he loved so well, and that heathen philosophy which he believed in so truly, a vital and dominant reality. Towards the close of the year 176 A.D., he reached Italy, and celebrated his merciful and bloodless triumph on the 23d of Dec. In the succeeding autumn, he departed for Germany, where fresh disturbances had broken out among the restless and volatile barbarians. He was again successful in several sanguinary engagements; but his originally weak constitution, shattered by perpetual anxiety and fatigue, at length sunk, and he died either at Vienna or at Sirmium, on the 17th of Mar., 180 A.D., after a reign of twenty years.

Marcus Aurelius A. was the flower of the stoical philosophy. It seems almost inexplicable that so harsh and crabbed a system should have produced as pure and gentle an example of humanity as the records of heathen—we had almost said, Christian history, can show. Perhaps, as a modern philosophic theologian suggests, it was because stoicism was the most solid and practical of the philosophic theories, and the one which most earnestly opposed itself to the rapidly increasing licentiousness of the time, that the chaste heart of the youth was drawn towards it. At twelve years of age, he avowed himself a follower of Zeno, Epictetus, etc. Stoics were his teachers—Diognotus, Apollonius, and Junius Rusticus; and he himself is to be considered one of the most thoughtful teachers of the school. Oratory he studied under Herodes Atticus and Cornelius Fronto. His love of learning was insatiable. Even after he had attained to the highest dignity of the state, he did not disdain to attend the school of Sextus of Chaeronea. Men of letters were his most intimate friends, and received the highest honors both when alive and dead. His range of studies was extensive, embracing morals, metaphysics, mathematics, jurisprudence, music, poetry, and painting. Nor must we forget that these were cultivated not merely in the spring-time of his life, when enthusiasm was strong, and experience had not saddened his thoughts, and when study was his only labor, but during the tumults of perpetual war, and the distraction necessarily arising from the government of so vast an empire. The man who loved peace with his whole soul, died without beholding it, and yet the everlasting presence of war never tempted him to sink into a mere warrior. He maintained uncorrupted to the end of his noble life his philosophic and philanthropic aspirations. After his decease, which was felt to be a national calamity, every Roman citizen, and many others in distant portions of the empire, procured an image or statue of him, which more than a hundred years after was still found among their household gods. He became almost an object of worship, and was believed to appear in dreams, like the saints of subsequent Christian ages.

There is one feature in his character, however, which it would be dishonest to pass over—his hostility, namely, to Christianity. He was a persecutor of the new religion, and, it is hastily demonstrated, was cognizant, to a certain extent at least, of the atrocities perpetrated upon its followers. Numerous explanations have been offered of his conduct in this matter. The most popular one is that he for once allowed himself to be led away by evil counselors; but a deeper reason is to be found in that very earnestness with which he clung to the old heathen faith of his ancestors. He believed it to be true, and to be the parent of those philosophies which had sprung up out of the same soil: he saw that a new religion, the character of which had been assiduously, though perhaps unconsciously, misrepresented to him, both as an immoral superstition and a mysterious political conspiracy, was secretly spreading throughout the empire, and that it would hold no commerce with the older religion, but condemned it, generally in the strongest terms. It was, therefore, comparatively easy, even for so humane a ruler, to imagine it his duty to extirpate this unnaturally hostile sect. Mr. John Stuart Mill finds in this tragical error of the great emperor a most striking warning against the danger of interfering with the liberty of thought. What he says is so completely in harmony with the

above conception of the motives of Marcus Aurelius, and is in itself so eloquent, that no apology is required in quoting the passage: "If ever any one possessed of power had grounds for thinking himself the best and most enlightened among his contemporaries, it was the emperor Marcus Aurelius. Absolute monarch of the whole civilized world, he preserved through life not only the most unblemished justice, but, what was less to be expected from his stoical breeding, the tenderest heart. The few failings which are attributed to him were all on the side of indulgence; while his writings, the highest ethical product of the ancient mind, differ scarcely perceptibly, if they differ at all, from the most characteristic teachings of Christ. This man, a better Christian, in all but the dogmatic sense of the word, than almost any of the ostensibly Christian sovereigns who have since reigned, persecuted Christianity. Placed at the summit of all the previous attainments of humanity, with an open, unfettered intellect, and a character which led him, of himself, to embody in his moral writings the Christian ideal, he yet failed to see that Christianity was to be a good and not an evil to the world, with his duties to which he was so deeply penetrated. Existing society he knew to be in a deplorable state. But such as it was, he saw, or thought he saw, that it was held together, and prevented from being worse, by belief and reverence of the received divinities. As a ruler of mankind, he deemed it his duty not to suffer society to fall in pieces, and saw not how, if its existing ties were removed, any others could be formed which could again knit it together. The new religion aimed openly at dissolving these ties: unless, therefore, it was his duty to adopt that religion, it seemed to be his duty to put it down. Inasmuch, then, as the theology of Christianity did not appear to him true, or of divine origin—inasmuch as this strange history of a crucified God was not credible to him, and a system which purported to rest entirely upon a foundation to him so wholly unbelievable could not be foreseen by him to be that renovating agency which, after all abatements, it has in fact proved to be—the gentlest and most amiable of philosophers and rulers, under a solemn sense of duty, authorized the persecution of Christianity. To my mind, this is one of the most tragical facts in all history. It is a bitter thought, how different a thing the Christianity of the world might have been, if the Christian faith had been adopted as the religion of the empire, under the auspices of Marcus Aurelius, instead of those of Constantine. But it would be equally unjust to him, and false to truth, to deny, that no one plea which can be urged for punishing anti-Christian teaching, was wanting to Marcus Aurelius for punishing, as he did, the propagation of Christianity. No Christian more firmly believes that atheism is false, and tends to the dissolution of society, than Marcus Aurelius believed the same things of Christianity; he who, of all men then living, might have been thought the most capable of appreciating it. Unless any one who approves of punishment for the promulgation of opinions, flatters himself that he is a wiser and better man than Marcus Aurelius—more deeply versed in the wisdom of his time—more elevated in his intellect above it—more earnest in his search for truth, or more single-minded in his devotion to it when found—let him abstain from that assumption of the joint infallibility of himself and the multitude, which the great A. made with so unfortunate a result." See Renan's *Marc Aurèle* (1882).

ANTONINUS PIUS, TITUS AURELIUS FULVUS, a Roman emperor (138–161 A.D.), was b. in the reign of Domitian (86 A.D.). The family of A. was originally from Nemausus, now Nîmes, in Gaul. A. inherited great wealth, and early gave proof of excellent qualities. In 120, he was made consul; afterwards was sent by Hadrian as proconsul into Asia, where the wisdom and gentleness of his rule won for him a higher reputation than had been enjoyed by any of his predecessors. By his wife Faustina he had four children, of whom three died, leaving a daughter, Faustina, afterwards wife of Marcus Aurelius. In 138, he was adopted by the emperor Hadrian, in consequence of merit alone, and came to the throne in the same year. The reign of A. was proverbially peaceful and happy. In his private character, he was simple, temperate, and benevolent; while in public affairs he acted as the father of his people. The persecution of Christians, which was continued during his reign, was partly stayed by his mild measures. He was little engaged in war, excepting in Britain, where he extended the power of Rome, and built a wall between the Forth and the Clyde, as a defense against invasions by the predatory inhabitants of the north; but he was frequently employed in arbitration and general counsel on the affairs of foreign states. "Happy the nation which has no history." The reign of A. illustrates this saying, for by the justice, wisdom, kindness, and courtesy of the emperor, his vast empire was preserved from the crimes, conspiracies, insurrections, and bloodshed, the recording of which formed the largest part of the historian's work in the dark centuries of the Roman empire. It is said that only *one* senator was impeached during A.'s lifetime. Literature received great encouragement; the laws were improved; commerce extended; the means of communication were facilitated by the repair of roads, bridges, etc.; new sanitary regulations were introduced; and a taste for architecture fostered in the citizens. The epithet *Pius* was conferred on him on account of his conduct in defending the memory of his predecessor Hadrian against certain dishonoring measures brought forward by the senate. A. d. in 161 A.D. The column raised to his memory by his adopted son and successor, Marcus Aurelius Antoninus (q.v.), was discovered in 1709, and now exists only in fragments. The so-called pillar of Antoninus, now in the *Piazza Colonna* at Rome, is that raised by the senate in honor of Marcus Aurelius, after his victory over the Marcomanni.

ANTONINUS, ITINERARY OF, *Antonini Itinerarium*, a valuable geographical work, containing the names of all the places and stations on the principal and cross roads of the Roman empire, with their distances from each other in Roman miles. It has been usually attributed to the emperor M. Aurelius Antoninus, whence its name. The testimony, however, of the Greek geographer Æthicus, author of the *Cosmographia*, assures us that a general survey of the Roman empire was commenced 44 B.C., in the consulship of Julius Cæsar and M. Antonius, and completed in the reign of Augustus, when the results of the survey received the sanction of the state. These results, it is with some probability inferred, are embodied in this *Itinerary*, which, it is further supposed, received additions and amendments in the time of the Antonines. Subsequent improvements were made down to the reign of Diocletian. The best editions are those of Wes-seling (Amst., 4to, 1735) and Parthey (Berl., 1848).

ANTONINUS, WALL OF, *Antonini vallum*, a barrier erected between the firths of Forth and Clyde by the Romans, in the reign of Antoninus Pius, to restrain the encroachments of the native tribes. A fragment of a Roman pillar, which was at one time in the university of Edinburgh, fixes the date of its erection as 140 A.D. The superintendence of the work is generally attributed to the imperial legate Lollius Urbicus. Its length was about 27 English m.—the eastern termination being, according to two different suppositions, at Carriden, or at Kinniel, on the Forth; the western, at old Kilpatrick, or at Dunglass Castle, on the Clyde. The work consisted of a ditch about 20 ft. deep and 40 wide, a rampart of earth and stone about 20 ft. high and 24 ft. thick at the base, and on the inner or s. side of the rampart a paved military road. It was protected by a chain of nineteen forts, with watch-towers between. The line of the wall may still be traced to a considerable extent. The most perfect fragments are at Elf hill, on the moor of Bonnieside, about a mile and a half from Castlecary; within the park of Callander house, near Falkirk; and on the slopes at Inveravon, not far from the railway station at Polmont. It is commonly designated *Graham's Dike*—a name given also to more than one ancient ditch and rampart in England. See SEVERUS, WALL OF. For best accounts of the wall of Antonine see Roy's *Military Antiquities of the Romans in North Britain* (1793) and Stuart's *Caledonia Romana* (2d ed., 1852).

ANTONIO, NICOLAS, 1617–84; a Spanish bibliographer and critic. In 1659, Philip IV. made him his general agent at the court of Rome, where he remained 20 years, and employed most of his time on his great work, which was a complete list of Spanish authors and a catalogue of their writings. He published part of it in 1672 under the title *New Spanish Library*, and in 1696 the *Old Library* appeared. About 1677, he was fiscal for the royal council in Madrid. His *Bibliotheca Hispana* is considered by some critics the best work on Spanish literature. He also wrote a critique on fabulous histories.

ANTONIUS, MARCUS, b. 143, killed 87 B.C.; commonly called "the orator;" one of the most eloquent of Roman lawyers and speakers. He was the grandfather of Mark Antony, the triumvir. In 103 he obtained the government of Cilicia, with the title of proprætor, and in 99 became consul. He favored the aristocratic party, and was an adherent of Sulla in the civil war against Marius, by whose order he was assassinated. In the judgment of Cicero, Marcus A. and L. Crassus were the first Roman orators who equaled the great speakers of Greece.

ANTONIUS, MARCUS (MARK ANTONY), the Roman triumvir, b. in 83 B.C., a descendant of one of the oldest patrician families, was the son of the prætor M. Antonius Creticus, and, on the side of his mother Julia, was related to Julius Cæsar. His youth was wasted in dissipation, and finding himself pressed by numerous impatient creditors, he escaped to Greece in 58 B.C., where, for a short time, he listened to the teaching of Athenian philosophers and orators. His studies here were soon interrupted by the proconsul Gabinius, who appointed him as leader of his cavalry. In the campaign against Aristobulus in Palestine, and in Egypt, A. distinguished himself by his courage and activity, and ingratiated himself with the soldiers. After assisting Cæsar in Gaul, he went to Rome in 50 B.C., to advance the interests of the former, who stood in great danger from the hostility of the oligarchical party, and was appointed an augur, and chosen one of the tribunes of the people. In the following year, on account of his adherence to the party of Cæsar, he was expelled from the curia, and fled to Cæsar, who made use of this event as a pretext for his war against Pompey. At the outbreak of this war, A. received the appointment of commander-in-chief in Italy. In the battle of Pharsalia, he commanded the left wing of Cæsar's army. In 47, he was made master of the horse by Cæsar, who left him to govern Italy during his absence in Africa. Antony, as usual, disgraced himself; got perpetually drunk; divorced his wife, and married an actress, with whom he paraded offensively through the chief towns of the peninsula. In 44 B.C., he married Fulvia, the widow of Clodius; was made consul, and vainly endeavored to prevail on the Romans to recognize Cæsar as emperor. After the assassination of Cæsar, he played the part so well described by Shakespeare; and by his funeral oration, and the well-timed display of Cæsar's bloody robe, so wrought on the passions of the people, that the conspirators were compelled to escape from Rome, leaving the successful orator for a while in possession of almost absolute power. Next, we find A. occupied in disputes and reconciliations with Octavianus (Cæsar's heir), besieg-

ing Mutina, and then denounced by Cicero as an enemy of the state. In 43 B.C., his troops were defeated at the battle of Mutina, when he escaped beyond the Alps; visited the camp of Lepidus, who commanded in Gaul; and gained the favor of the army, of which he took command. Plancus and Pollio joined him with their troops; and A., who so recently had escaped as a helpless fugitive from Italy, returned to Rome at the head of 17 legions and 10,000 cavalry. Octavianus, who had pretended to maintain republican principles, now threw off the mask, and held a consultation with A. and Lepidus on the island of Reno (or Lavino), near Bologna, when it was determined that these triumviri should share the whole Roman world among themselves. To secure their spoil, they returned to Rome, and began their course of murder and robbery throughout Italy. Among their first victims fell Cicero, the orator, whose eloquence they dreaded. According to Appian, not less than 300 senators and 2000 knights fell under the power of the triumviri. After making Italy safe for themselves, and raising an enormous sum of money to carry on their war abroad, A. and Octavianus led their troops into Macedonia against Brutus and Cassius, and defeated the republican forces. A. next paid a visit to Athens, and then went into Asia, to arrange his dispute with Cleopatra, queen of Egypt, whose conduct had offended the triumviri. The queen herself appeared to answer his challenge, and captivated A. by her beauty and address. The general who had overcome Brutus and Cassius was now made a prisoner, though not of war. He followed Cleopatra into Egypt, and lived with her in idleness and luxury, until he was aroused by tidings of the quarrel which had taken place in Italy between his own relatives and Octavianus. This dispute gave rise to a short war, which came to an end before A. arrived in Italy. A new division of the Roman world now took place between the triumviri, and was soon quietly arranged at Brundisium. A. took the east, and Octavianus took the west; while the ambition of the feeble Lepidus was appeased by his having the whole of Africa for his portion. Even this shadow of dominion was taken from him in 36 B.C. Meanwhile A. had confirmed his friendship with Octavianus by a marriage with Octavia, his sister. He now returned to Cleopatra, resumed his former voluptuous mode of life, squandered the wealth of Rome in gifts to his royal mistress, and became guilty of gross acts of injustice. Octavianus made use of these facts to excite the indignation of the Roman people against A., and a war between the rivals became unavoidable. A., in his idleness, tried to postpone the trial of strength which he saw inevitably approaching, and filled the island of Samos (where his troops were quartered) with musicians, jugglers, and buffoons. Meanwhile, at Rome, he was deposed from the triumvirate, and war was proclaimed against Cleopatra. Each party collected its forces, and in the naval engagement which took place (31 B.C.), near Actium (q.v.), A. was defeated. His subsequent hope of finding troops still faithful to him in Libya was disappointed. He returned to Egypt, where, with Cleopatra, he once more forgot political cares and vexations, until his amusements were suddenly interrupted by the arrival of Octavianus at Alexandria. A. now roused himself, made a charge with his cavalry, and repelled the enemy; but the advantage was only momentary. Deserted by the Egyptian fleet, as by his own army, and suspecting that even Cleopatra had conspired against him, he went to her palace, from which the queen had escaped. Deceived by a false message informing him of the death of Cleopatra, A. committed suicide by falling upon his sword, in the year 30 B.C.

ANTONINUS, or **ANTONY OF PADUA**, SAINT, was b. at Lisbon, Aug. 15, 1195, and, on the father's side, was related to Godfrey of Bouillon. He was first a monk of the Augustine order, and in 1221 became one of the most active propagators of the order of Franciscans. On his missionary voyage to Africa, being cast on the coast of Italy, he preached with great success at Montpellier, Toulouse, Bologna, and Padua, where he d., June 13, 1231. The legends of A. of P. are full of absurd fables. Among others, we are told that his eloquence as a preacher was so great that even the fish in the sea were deeply affected by it! His anniversary falls on June 13. His monument, a fine work of statuary, is in the church which bears his name at Padua.

ANTONOMA'SIA, in rhetoric, the substitution of any epithet or phrase for a proper name; as, "the Stagyrte," for Aristotle; "the little corporal," for Napoleon; the man on horseback," for Grant, etc. Sometimes the process is reversed; as, calling a good orator a "Cicero." In both cases the figure is akin to metonymy.

ANTON ULRICH, second son of Duke Ferdinand Albert of Braunschweig-Wolfenbützel (till 1735, Braunschweig-Bevern, the title by which the prince was first known in Russia), was b. in 1714. When the Russian empress Anna was looking out for an alliance for her niece, Anna Carlowna, princess of Mecklenburg-Schwerin, the influence of Austria led her to choose A. U. Accordingly, he came to Russia, in 1733, was appointed colonel of a cuirassier regiment, and placed in the receipt of a considerable pension. The marriage was, however, long delayed. The princess showed a decided distaste for the insignificant character of the bridegroom-elect, and only married him to avoid a still more hated union with the son of Biron. The birth of the prince Ivan took place in 1740, a year after the marriage. About the same time, the empress falling dangerously sick, appointed the infant prince her successor, and Biron regent. After her death, A. U. made some feeble attempts to reverse this appointment, which only led to the punishment of those supposed to have instigated them, and to his own military

degradation. Biron's conduct towards the parents of the infant prince becoming unbearably insolent, Anna appealed in despair to Gen. Münnich, who put a sudden end to Biron's sway, and declared the grand-duchess and her husband regents. After a few months, Anna ungratefully overthrew Münnich. After his fall, as little unity prevailed between the ministers at the helm as between herself and her husband, and the government was looked upon as both a foreign and a contemptible one. Then came the revolution of the 5th Dec., 1741, which raised Elizabeth Petrovna (q.v.) to the throne. A. U. and his consort were exiled, and lived long at Cholmogory, in the government of Archangel. Three children were born to them in exile. Anna d. in 1746. Catharine II. offered A. U. his freedom, but he declined it. Ultimately, he grew blind. The exact year of his death is uncertain, but it is supposed to have taken place about 1780. Catharine offered to his children an asylum in Jutland, where they all died in comfortable circumstances.

ANTONY, SAINT, surnamed **THE GREAT**, and also **ANTONY OF THEBES**, the father of monachism, was b. about the year 251 A.D., at Koma, near Heraklea, in upper Egypt. His parents were both wealthy and pious, and bestowed on him a religious education. Having, in obedience to what he believed to be a divine injunction, sold his possessions, and distributed the proceeds among the poor, he withdrew into the wilderness, where he disciplined himself in all those austerities which have hallowed his memory in the Catholic church, and formed the model of the monastic life. When 30 years of age, however, desirous of obtaining a deeper repose than his situation afforded, he penetrated further into the desert, and took up his abode in an old ruin on the top of a hill, where he spent twenty years in the most rigorous seclusion; but, in 305, he was persuaded to leave this retreat by the prayers of numerous anchorites, who wished to live under his direction. He now founded the monastery of Faïoum, which at first was only a group of separate and scattered cells near Memphis and Arsinoë; but which, nevertheless, may be considered the origin of cenobite life. The persecution of the Christians by Maximian, in 311 A.D., induced St. A. to leave his cell, and proceed to Alexandria, in the hope of obtaining the crown of martyrdom; but, having failed in this, he returned to his solitude in the course of a year, which, however, he soon left, and plunged yet deeper into the desert. At length he found a lodgment on a hill, about a day's journey from the Red sea; but his disciples, discovering his retreat, so pressed him with their affectionate importunities, that he ventured to accompany them back. After many pious exhortations, he once more left them, and soon became the mighty oracle of the whole valley of the Nile. In 355, the venerable hermit, then 104 years of age, made a journey to Alexandria to dispute with the Arians. He had interviews with Athanasius and other distinguished persons; but feeling his end approaching, he retired to his desert home, where he d., 356 A.D.

Athanasius states, in his *Life of St. A.*, that the saint wore only a coarse shirt of hair, and never washed his body, which is more credible than the stories he relates of his encounters with the devil, or his miracles. His whole conduct indicates the predominance of a glowing and yet gloomy fancy, which is the proper condition of religious asceticism. Although the father of monachism, St. A. is not the author of any monastic "rules;" those which the monks of the eastern schismatic sects attribute to him are the production of St. Basil. He is, perhaps, the most popular saint in the Catholic church. Accounts of his life and miracles are given in the *Acta Sanctorum* of the Bollandists, under the date of the 17th Jan., on which day his festival was kept.

ST. ANTHONY'S CROSS, or the **TAU CROSS**, is shaped like the letter T. In heraldry the name denotes an ordinary cross consisting of two stripes, one horizontal, the other vertical, crossing each other in the centre of the escutcheon.

ST. ANTHONY'S FIRE.—The Rev. Alban Butler, in his *Lives of the Saints*, gives the following account of the origin of this name: "In 1089, a pestilential erysipelatos distemper, called the *sacred fire*, swept off great numbers in most provinces of France; public prayers and processions were ordered against this scourge. At length, it pleased God to grant many miraculous cures of this dreadful distemper to those who implored his mercy through the intercession of St. A., especially before his relics; the church [of La Motte St. Didier, near Vienne, in Dauphiné] in which they were deposited was resorted to by great numbers of pilgrims, and his patronage was implored over the whole kingdom against this disease." The "order of canons regular of St. Anthony," a religious fraternity, founded about 1090, for the relief of persons afflicted with the fire of St. A., survived in France till 1790.

ANTRAIGUES, EMANUEL-LOUIS-HENRI DELAUNAY, Count of, a great politician, but very ambiguous character, was b. at Vivarais, in the department Ardèche, in 1755, and was educated under the Abbé Maury. His superior talents were first displayed in his *Mémoire sur les Etats généraux, leurs Droits et la Manière de les convoquer* (1788). This book, full of daring assertions of liberty, was one of the first sparks of the fire which afterwards rose to such height in the French revolution. In 1789, when A. was chosen as a deputy, he not only defended the privileges of the hereditary aristocracy, but also ranked himself with those who opposed the union of the three estates; while in the discussions on the constitution, he maintained that the royal *veto* was an indispensable part

of good government. After leaving the assembly, in 1790, he was employed in diplomacy at St. Petersburg and Vienna, where he defended the cause of the Bourbons. In 1803, he was employed under Alexander of Russia in an embassy to Dresden, where he wrote against Bonaparte a brochure, entitled *A Fragment of the 18th Book of Polybius, discovered on Mount Athos*. He afterwards came to England, and acquired great influence with Canning. Despite his attachment to the interests of the Bourbons, he could never win the confidence of Louis XVIII. In 1812, he was murdered, with his wife, at his residence near London, by an Italian servant, who, immediately after the act, committed suicide.

ANTRIM, a co. of Michigan, in the n.w. part of the lower peninsula, on Grand Traverse bay; 700 sq. m.; pop. '90, 10,413. Farming is the main business. Co. seat, Bellaire.

ANTRIM, a maritime co. in the n.e. of Ireland, in the province of Ulster; bounded, n., by the Atlantic; w., by the n. part of the river Bann, dividing it from Londonderry, and by lough Neagh; s., by Lagan river, separating it from the co. of Down; s.e., by Belfast lough; and e. by the Irish channel. It stands third among the Irish counties in population, but in extent only ninth. Its greatest length is 56 m.; its greatest breadth, 20; its extent of sea-coast, 90 m. Area, 1164 sq.m. About two thirds of this is arable; a fourth, barren; and a seventy-fourth in woods. The population in 1851 was 352,264; '61, 368,948; '81, 421,943; '91, 427,968, of whom about one half were Protestants, chiefly Presbyterians. Off the n. coast lie Rathlin isle and the Skerries; and off the e. coast, the Maiden rocks. The e. coast is hilly; and from Larne to Fair Head, parallel mountain-ranges of no great height, and covering a third of the county, stretch s.w. into the interior, forming valleys opening seaward, called the glens of Antrim. The interior slopes towards lough Neagh. The highest eminences are—Trostan, 1810 ft.; and Slievemish, or Slemish, 1782 ft. The principal streams are—the Bann, from lough Neagh to the Atlantic; the Main, running parallel to the Bann, but in the reverse direction, into lough Neagh; and the Bush, flowing n. into the Atlantic. Many peat-bogs occur in the county. Six sevenths of the surface consists of basaltic trap, often alternating with red ochre, and overlying hardened chalk, green-sand, new red sandstone, and mica-slate. The surface and edges of the trap-field, in some places, present basaltic columns of varied outlines. The green-sand and new red sandstone crop out on the e. and s.e. borders, and millstone grit occurs in the n.e. Between Ballycastle and the mouth of the Bann, the basalt assumes very picturesque forms; and the Giants' causeway is one of the most perfect examples of columnar basalt in the world. Fine salt-mines occur at Duncrue and Carrickfergus; and small coal-fields near Ballycastle and in the interior. Rich beds of iron ore of fine quality have been recently opened in Glenravel, and a large export has been carried on from Cushendall and Carnlough. The soil of A. is mostly light, and the chief crop is oats. The land is very much subdivided; and the rearing of flax, and the various branches of the linen, cotton, and coarse woolen manufacture, employ a great portion of the people. There are important salmon and other fisheries on the coast. In Belfast and the vicinity the chief industry is the spinning of cotton and linen yarn, and weaving. The principal towns are—Belfast, Lisburn, Ballymena, Ballymoney, Carrickfergus, Larne, and Antrim. Antrim co. returns four members to parliament, one for each of the divisions (Northern, Southern, Eastern and Middle), besides four members for the borough of Belfast. The inhabitants are mostly Presbyterians, the county having been extensively colonized from England and Scotland. The original possessors were the O'Neills, who, partially dispossessed by John de Courcy, reappeared as chief, on the failure of his line, and in 1533 regained the whole country except Carrickfergus and part of the glens—held by the Bissets of Glenarm. The forfeiture of Shane O'Neill terminated the dominion of his race.

ANTWERP (in French, **ANVERS**), the capital of the province which bears its name, and the chief commercial city of Belgium, is situate on the river Scheldt. Pop. '94, 256,620. Its chief public institutions are—the Academy of Sciences, Academy of Painting and Sculpture, formerly known as the Academy of St. Mark, a medical and surgical school, naval arsenal, museum, and zoological gardens. The cathedral, one of the noblest gothic structures in Europe, is 500 ft. in length by 240 in breadth, with a roof supported by 125 pillars, and a very lofty spire. The interior is enriched by the two greatest of all the pictures of Rubens, the *Elevation* of and the *Descent* from the Cross. The church of St. James contains the monument of the Rubens family. The new fortifications, recently erected, render the commercial capital of Belgium one of the most strongly fortified places in Europe. The trade and manufactures of A. have recently greatly extended, and the large dock and quay accommodation having been found too limited, steps have been taken for making a new quarter of the town, with ample harbor-room, on the opposite side of the Scheldt. The manufactures consist chiefly of sugar, white-lead, cotton goods, point-lace, linen thread, carpets, gold and silver lace. It is still celebrated for its sewing-silk, black silk stuffs, and printer's ink, as it was in former times for its velvets, damasks, and satins. There are also to be mentioned tobacco-manufacture, the cutting of diamonds and other precious stones, and ship-building.

A. is mentioned as early as the 8th c.; in the 12th and 13th it gave signs of considerable prosperity, and in 1550 numbered more than 200,000 inhabitants. The union of Belgium with Holland in 1815 was very favorable to the commerce and general prosperity of A. By the revolution of Aug., 1830, it was linked to the destiny of Belgium. When the revolutionary party gained possession, the commandant, Gen. Chassé, retreated to the citadel, and, exasperated by the breach of truce, commenced a bombardment, which destroyed the arsenal and about thirty houses. In 1832, a French army of 50,000 men, under Marshal Gérard, appeared before A., to demand the surrender of the citadel, which Gen. Chassé refused. After the interior of the citadel had been reduced to ruins by the French artillery, Gen. Chassé capitulated; the Flemish fortification, and the Forts Burght, Zwindrecht, and Austroeweel were surrendered to the Belgian troops, and the Dutch troops were taken to France, as hostages for the surrender of the Forts Lillo and Liefkenshoek, according to an article in the negotiation of Nov. 15, 1831, which stipulated that the five citadels held by the Dutch troops in Belgium should be surrendered.

ANUBIS, an Egyptian deity, styled Anepu on hieroglyphic monuments, was, according to mythology, the son of Osiris and Nephthys. By the Greeks, he was frequently styled Hermes or Hermanubis, combining the Egyptian with the Grecian name. He is represented on monuments as having the head of a jackal, with pointed ears and snout, which the Greeks frequently changed to those of a dog. Sometimes he is seen wearing a double crown. A white and yellow cock was sacrificed to him. His office, like that of Hermes Psychopompos among the Greeks, was to accompany the ghosts of the deceased into Hades (Amenthes), and there to assist Horus in weighing their actions, under the inspection of Osiris. As, in the time of the Romans, the Egyptian worship had spread beyond Egypt itself, the two conceptions of A. and Hermes were blent together, and the dog's head of the former was found united to the insignia of the latter. See *illus.*, **EGYPTIAN DEITIES**, vol. V.

ANUPSHAHAR', a t. of India, in the British district of Bolundshuhur, n. w. provinces, on the right bank of the Ganges, 73 m. e. from Delhi, on the route to Bareilly. The channel of the Ganges is here about a mile wide, but only about one-fifth of that space is occupied by the stream in the dry season. Pop. 8000.

ANUS, THE, AND ITS DISEASES. The term *anus* is applied by anatomists to the lower or (in the case of animals) the posterior aperture of the intestinal canal; the rectum terminating externally in the anus. With regard to its anatomy, it is sufficient to state that it is kept firmly closed on ordinary occasions by the *external* and *internal sphincter* muscles, the former of which contracts the integument around the opening, and, by its attachment to the coccyx behind, and to a tendinous center in front, helps the *levator ani* muscle in supporting the aperture during the expulsive efforts that are made in the passage of the fæces or intestinal evacuations; while the latter or *internal sphincter*, is an aggregation of the circular muscular fibres of the lowest part of the rectum, and acts in contracting the extremity of the tube. The main function of the *levator ani* muscle is expressed in its name, it being the antagonist of the diaphragm and other muscles which act in the expulsion of the fæces. The integument around the anus lies in radiating plaits, which allow of its stretching without pain during the passage of the fæces; and the margin is provided with a number of sebaceous glands, which, in some of the lower animals, secrete strongly odorous matters. See **ANAL GLANDS**. Infants are occasionally born with an imperforate *anus*, or congenital closure of the rectum. In the simplest form of this affection, the anus is merely closed by thin skin, which soon becomes distended with the meconium (q.v.). More complicated cases are those (1) in which the gut terminates some distance above the seat of the anus in a blind sac or pouch, (2) where the rectum terminates in the bladder, etc. Fortunately, the closure by a layer of skin is far the most common form of imperforate anus, and the little patient is at once relieved by a very simple surgical operation. If, however, no treatment be adopted, which is too often the case, in consequence of a popular delusion that the affection is incurable, the abdomen becomes distended and hard, vomiting comes on, the vomited matters soon assume a faecal smell, and the infant dies in a few days, either from exhaustion or rupture of the intestines.

Spasm of the sphincter ani is by no means a rare affection; it is characterized by violent pain of the anus, with difficulty in passing the fæces. On attempting an examination, the muscle feels hard, and resists the introduction of the finger. It usually occurs in sudden paroxysms, which soon go off; but sometimes it is of a more persistent character. Its causes are not clearly known, and although most surgeons regard it as a special affection, some consider that the spasm is not a disease in itself, but merely a symptom of some slight excoriation or ulceration. Suppositories containing opium or belladonna introduced during the period of relaxation, are sometimes of use; and if there are ulcers, they must be specially treated. *Ulceration* occurring as a breach of surface at one or more points around the anus, but not extending within the orifice, is by no means uncommon in persons who are not attentive to cleanliness, and especially in women with vaginal discharges. Strict attention to cleanliness, the patient being directed to apply warm water to the parts at least twice daily with a sponge (which after each operation should be carefully rinsed out), and one or two applications of the solid

nitrate of silver, followed by black-wash, will effect a speedy cure. If the ulcer is seated partly *without* the anus and partly *within* the rectum, the distress is much more severe, and the treatment often requires the use of the knife. *Fissure of the anus* is a term applied to an affection consisting in one or more cracks, excoriations, or superficial ulcerations, situated between the folds of the skin and mucous membrane at the verge of the anus, and only slightly involving the rectum. They give rise to intense pain during the passage of the evacuations, and for some hours afterwards to great discomfort, smarting, and itching. The treatment to be adopted is to endeavor to procure regular and somewhat soft evacuations, and to sponge with warm water immediately afterwards, the parts being dried with a soft cloth. One or two applications of solid nitrate of silver will sometimes cure the disease; and an ointment of oxide of zinc, or one containing chloroform, will sometimes serve to allay the irritation and heal the parts.—*Pruritus ani*, which simply means intense itching and irritation of this part, is perhaps rather to be regarded as a symptom of certain morbid changes rather than as a special disorder; but as it is a very common affection, and is productive of much suffering, it must not be passed over. It is often associated with an unhealthy state of the intestinal secretions, or with simple constipation; with a congested state of the mucous membrane; with a disordered condition of the womb; with the presence of thread-worms in the rectum, etc.; and it is peculiarly common in persons whose occupations are sedentary. The affection is often much aggravated by the patient's being unable to refrain from scratching the parts, which leads to excoriations, ulcerations, thickening of the skin, etc. The symptoms are usually most severe when the sufferer begins to get warm in bed. If the affection arise from worms, or a loaded state of the large intestines, enemata and purgatives will give immediate relief. If unhealthy excretions exist, attention must be paid to the diet, and the occasional administration of a pill containing a grain of calomel and four grains of watery extract of aloes, together with the local application of soap and water to the parts, will often stop the itching. If there are any cracks or ulcers, nitrate of silver must be applied until they heal. To prevent the reappearance of these sores, the patient should bathe the parts night and morning with a strong solution of alum. An ointment composed of a drachm of calomel and an ounce of lard is strongly recommended by Dr. Smith of King's College Hospital, when other means have failed; who also states that the daily introduction of a well-oiled bougie, made of black wax, will sometimes succeed in very obstinate cases. The other principal affections of the anus are *fistula*, *piles*, and *prolapsus*, which are discussed in special articles.

ANVIL, an iron block, with a smooth, flat, steel face, on which malleable metals are hammered and shaped. A.'s are of all sizes, from the tiny articles used by watchmakers to the immense masses for trip-hammer work in great iron foundries. The common A. of blacksmiths has a cone or horn at one end, and a socket for a chisel in the other. The best A. are made of cast iron, faced with steel, the steel being placed at the bottom of the mold and the iron poured upon it.

ANVILLE, JEAN BAPTISTE BOURGUIGNON D', a celebrated French geographer, b. at Paris in 1697, d. in 1782. He devoted his whole life to geographical science. Such was his natural taste for map-drawing that his first study of the ancient authors induced him to publish, at the age of 15, a map of Greece. His rare qualities gained him the friendship of the Abbé de Songuerue, from whom he received those instructions which were the source of that profound and extensive knowledge he subsequently acquired. He read the Greek and Latin historians and philosophers, as well as poets, specially noting the names and positions of cities and nations. He advanced the science of geography, not only by the vast number of maps which he executed, but also by the treatises, full of erudition and of historic and critical details, in which he discussed numerous interesting questions. The works of A. announced by M. de Maine many years ago, were to have been contained in 6 vols., exclusive of the volumes of maps. The principal portion was published in 1834 by Levraut. But the death of M. de Maine in 1832 stopped the quarto edition near the end of the twelfth volume, to which the map of Africa was however wanting, although the text had been added, with notes digested from the most recent investigations in that country. A. has left 211 maps and plans, and 78 memoirs, the most of which are inserted in the *Recueil des Mémoires de l'Académie des Inscriptions et Belles-lettres*. His best map is that of ancient Egypt. His *Orbis Veteribus Notus*, and *Orbis Romanus*, are also invaluable. The same remark applies to his maps of Gaul, Italy, and Greece, both ancient and medieval. His maps of modern countries contain all the knowledge attained in his time. His valuable collection of maps was purchased in 1779 by the French government for the royal library.

ANWARI, a celebrated Persian poet, who flourished during the 12th c., was b. in the province of Khorassan, and educated at the college of Mansur, at Tus. He emerged from obscurity in the course of a night. The story goes that the Seljukide sultan, Sanjar, happened on one occasion to visit Tus, when the imagination of the youthful poet was so excited by the presence of the monarch and his glittering retinue, that he resolved to write a poem in his praise. By next morning it was finished, and presented to Sanjar, who instantly placed the fortunate youth among his courtiers. A. now began to devote himself to astrology, which was his ruin; for having predicted that in 1185 or 1186 A.D. a hurricane would burst over all Asia, overthrow the most solid edifices, and shake the

very mountains, and nothing of the sort really occurring, but, on the contrary, an entire year of remarkably tranquil weather, he fell into disgrace, and had to retire to Balkh, where he died in 1200–1201 A.D.

His poems consist chiefly of lengthy panegyrics and shorter lyrical effusions. The latter (*ghazels*) are characterized by simplicity, ease, and naturalness; but the *kasidas*, or long poems, are disfigured, like many other eastern poems, by glittering imagery and historical conceits. His *Elegy on the Captivity of Sanjar taken Prisoner by the Ghurides* has been translated into English by captain Kirkpatrick in the first volume of *Asiatic Miscellanies* (Calcutta, 1785).

ANZIN, a t. in the dept. of Nord, France, on the Scheldt, near Valenciennes, in the centre of a most valuable coal-mining district. A. has iron foundries, glass-works, breweries, and distilleries. Pop. 11,400.

AO NIA, a district of ancient Greece, in which are Mt. Helicon (the Aonian mount) and the fountain Aganippe. In fable, A. was a favorite haunt of the muses, who were called "Aonides."

AONLAGANJ, or AOUNLAH, a t. of India, in the British district of Bareilly, 21 m. s.w. from Bareilly, on the route to Allypurrh. It has a large bazar.

AORIST, a form of the Greek verb by which an action is expressed as taking place in an indefinite (Gr. *aoristos*) time. The Greek language is especially fertile in the past tenses of verbs, having, in addition to the tenses common to other languages—namely, the imperfect, perfect, and pluperfect—the A., which is peculiarly adapted to the narrative style of writing. The distinction of first and second A. is purely formal.

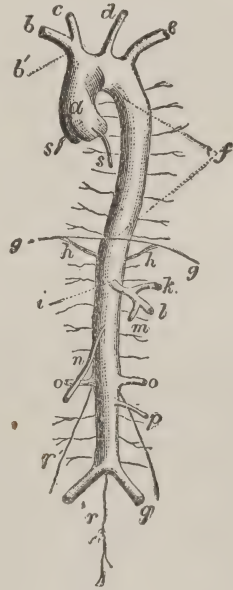
AORTA is the great arterial trunk which, rising from the left ventricle of the heart, sends its branches ramifying through the whole body. The A. in man is subdivided by anatomists into the arch, the thoracic A., and the abdominal A. The *arch* is a loop with the convexity directed upwards, forwards, and to the right side, reaching at its highest part to a level with the second piece of the breast-bone, and then descending to the left side of the third dorsal vertebra. Five arteries arise from the arch—viz., two coronaries, for the supply of the muscular tissue of the heart itself; the innominate; and the left carotid and left subclavian arteries. At the commencement of the arch are three small swellings or pouches, the aortic sinuses, below which are the three semilunar valves or folds of the lining membrane, which prevent regurgitation of the blood back into the heart. The *thoracic A.* extends from the third dorsal vertebra to the diaphragm, gradually getting into the middle line of the spine. The thoracic A. gives off the bronchial arteries (two or three) to supply the tissue of the lungs; and some small branches (three or four) to the cesophagus, and intercostal arteries, to supply the walls of the chest (ten on left, and nine on right side). The *abdominal A.* passes from the diaphragm to the fourth lumbar vertebra, opposite the lower margin of which it divides into the two common iliac trunks. The abdominal A. gives off the two phrenic arteries to the diaphragm; the coeliac axis, which divides into three large branches for the stomach, liver, and spleen; the superior mesenteric for the small, and part of the large intestine; the *renals* (two); the *supra-renals* (two), one for each kidney; the spermatic; the inferior mesenteric, for the part of the large intestine not supplied by the superior mesenteric; and four or five lumbar arteries, which supply the lower part of the abdominal walls (the loins).

Where the A. bifurcates, a small artery, the *sacra-media*, or *caudal artery*, arises, and passes along in the middle line; in fish and in animals with large tails, this branch is a continuation of the A.

The above is the usual arrangement; but occasionally it varies, especially in the number of arteries springing from the arch. The structure of the A. will be given under **ARTERY**; and the comparative anatomy under **CIRCULATION**.

During foetal life, there is a communication between the arch of the A. and the pulmonary artery called the *ductus arteriosus*, the canal of which becomes obliterated after birth. It has been calculated that the velocity of the blood in the ascending part of the arch is $2\frac{1}{2}$ in. in a second. The pressure of the blood in the A. of a horse has been estimated to be 11 lbs.; and in man's, 4 lbs. 6 ozs.

The coats of the A. are very subject to fatty disease termed *atheroma* (q.v.), and in advanced life, to calcare-



Aorta:

a, ascending arch of aorta; ss, coronary arteries; b', innominate artery; b, right subclavian; c, right carotid; d, left carotid; e, left subclavian; f, thoracic aorta; gg, diaphragm; hh, phrenic arteries; i, coeliac axis; k, coronary or gastric; l, splenic; m, hepatic; n, superior mesenteric; oo, renal arteries; p, inferior mesenteric; p', spermatic; q, common iliac; r, middle sacral.

ous degeneration or deposit of earthy particles, which destroys their elasticity. This change renders them very liable to aneurism (q. v.), which, as may be expected, is generally situated at the curves of the A., especially at the arch. Sufferers from this disease in the arch or thoracic A., suffer from palpitation within the chest, difficulty of breathing, occurring in paroxysms and during sleep, and shoots of pain through the chest. If the aneurism is on the arch, it generally presses forward, and may completely destroy the breast-bone, forming a pulsating tumor, covered only by the skin, or it may press up into the neck. If low in the chest, the aneurism may compress the thoracic duct, and cause emaciation. In the abdomen, the symptoms are pulsation and pain; but in both situations aneurism may exist for a length of time without attracting attention.

In some cases the A. has been found obliterated, showing that the lower extremities can be supplied with blood by the anastomosing branches.

AOSTA, a district of the province of Turin, in north Italy, surrounded by the highest elevations of the Alps, and watered by the river Dora-baltea. It contains an area of 1293 sq. m. The dense pine-woods on the hills, the alpine pastures on the slopes, the plantations of vines, almonds, olives, figs, and mulberry trees in the valleys, and the ores of silver, copper, and iron in the bosom of the mountains, supply occupation and means of subsistence to a considerable population; but the land generally is not adapted to the growth of corn, though maize, barley, oats, etc., are produced in the lowest portions of the valleys. The disease styled cretinism (q. v.) prevails to a lamentable extent, and few persons are altogether free from goiter (q. v.). Great numbers of the poorer class emigrate during winter into the richer countries in their vicinity, and earn a livelihood as chimney-sweepers, masons, and smiths. — **AOSTA**, the principal t., 49 m. n. n. w. of Turin has a population of about 7000, and a large trade in cheese, hemp, leather, etc. It was in ancient times the chief residence of the Salassi, a brave race of mountaineers, with whom Appius Claudius (134 B.C.) had to contend on his way into Gaul. They were finally destroyed by Terentius Varro in the time of Augustus. Monuments of the Roman times—a well-preserved arch, two gateways, the ruins of an amphitheater, and a bridge—still remain. The celebrated baths and mines of St. Didier are in the neighborhood. St. Bernard, the founder of the famous hospice which bears his name, was archdeacon of A.; and Anselm, archbishop of Canterbury, was b. here.

APACHE'S, Indians of Mexico, New Mexico, and Arizona; warlike nomads, roaming over Texas and the Mexican states. They wander and fight on horseback, and are usually at enmity with white men, resisting all efforts to Christianize or civilize them. Very few ever cultivate the soil, their living being derived chiefly from the chase and from robbery. But those in Arizona were placed on a reservation, in 1874.

APACHE, a northwestern co. of Arizona, formed 1879 from part of Yavapai. Area, 21,060 sq. m.; pop. '90, 4281. Co. seat, St. Johns.

APATI, MICHAEL I., Prince of Transylvania, was b. in 1633, of an old but decayed family. He accompanied Prince George II. in an expedition against the Poles in 1656, but was taken prisoner at the irruption of the Tartar hordes under their khan, Mohammed Girai. After his release, he went and lived for a short time at his paternal estate; but in 1661 he was chosen prince of Transylvania, at the instigation or desire of Ali Pasha, generalissimo of the Turkish forces under Sultan Mahmoud IV. During the peace concluded with Austria, he reigned peaceably under the protection of the porte, and acquired the towns of Clausenburg and Rathmar. He remained faithful to the Ottoman power till the siege of Vienna in 1683. Fortune then changed. The imperial troops penetrated into the country; and on the 12th of Aug., 1687, A. made a treaty with the emperor at Harkany, by which Transylvania was declared to be freed "forever" from Turkish suzerainty, and placed under German protection. At Fogaras, on the 1st of July 1688, the Transylvanian deputies assembled at the national diet, took the oath of fealty to the Hapsburgs as legitimate monarchs of Hungary. Ever since the death of his wife, Anna Bornemitz, in 1688, A. had been sorely afflicted both in body and mind, and died (April 15, 1690) on the eve of a fierce retributive war, commenced by his old allies, the Turks, who considered themselves ill used by his desertion of them. His son, Michael II., succeeded to the throne and its perils. The Turks, under the vizier Cuprigli, overthrew the imperial army, and took several places, such as Nissa, Widdin, Semendria, Belgrade, etc.; but the intestine troubles of the Ottoman empire hindered them, or rather Count Tekeli, the adventurer whom they were helping, from retaining these towns. The imperial troops subsequently regained everything; and at length the young Transylvanian prince was inveigled to Vienna, and cajoled into giving up his dominions to Austria in lieu of a pension of 12,000 or 15,000 florins. He died in 1713.

APANAGE is not an English legal term, but is a technical word in the French law, in which system it signifies the assignment or conveyance by the crown of lands and feudal rights to the princes of the royal family, that they may be enabled to maintain themselves according to their rank. (See a long article on this subject in Knight's *Political Dictionary*, which refers to Rotteck and Welcker, *Staats-Lexicon*, art. by P. A. Pfizer. See also Merlin's *Répertoire de Jurisprudence* under this head.) The word A., however, is sometimes found in Scotch law-books, the Scotch lawyers having most probably derived it from France, whose system of laws was so largely imported into Scotland—the Court of Session itself having been modeled after the plan of the parliament of Paris. Mr. Erskine, in his *Principles of the Law of Scotland*, book i., tit. 4, sec. 8, says:

The A., or patrimony of the prince of Scotland, has been long erected into a regality jurisdiction, called the principality. It is personal to the king's eldest son, upon whose death or succession it returns to the crown. The prince has, or may have, his own chancery, from which his writs issue, and may have his own chamberlain and other officers for receiving and managing his revenue;" and the late prof. Bell, in his *Principles of the Scotch Law*, calls this principality the prince's "perpetual A. and personal provision." In England, the duchy of Cornwall may be said to be an A. of the prince of Wales, in whose person, also, since the junction of the two kingdoms under the same crown, now merge the rights of the prince of Scotland. His royal highness, in fact, when he goes north, ought strictly to be called, not prince of Wales, but prince of Scotland.

In common parlance in England, the word A. is loosely used to denote any extra-territorial jurisdiction or sovereignty by governments or states; and even any dignity or right enjoyed by persons of rank.

APARTMENT HOUSES. See HOUSES, APARTMENT.

APATHIN, a t. of Hungary, in the co. of Bacs, near the left bank of the Danube, 49 m. s.w. from Theresiopol. It has manufactures of woolen cloth, and a considerable trade in hemp, silk, madder, and woad, the products of the vicinity. Pop. 12,800.

APATITE is the scientific and commercial name applied to a mineral mainly consisting of phosphate of lime (bone-earth), and which for some years past has been largely used in the preparation of manures. It is employed for the same purpose as bones or bone-ash—namely, to supply phosphoric acid to the soil. The massive radiated variety is sometimes called *phosphorite*, and when massive, earthy, and impure, it is also known as *osteolite*. Coprolites (q.v.), or phosphatic nodules, are likewise mainly composed of phosphate of lime. A. is found as a bedded rock, in compact spheroidal masses, in veins and dykes, and as an accessory constituent of rocks. It exists in nearly all geological formations, but is perhaps most abundant in the older metamorphic rocks. Extensive deposits of A. occur in various parts of the world. From Kragerøe in Norway, where it occurs associated with granitic rocks, and from Estremadura in Spain, where it is found in cretaceous strata, it has been largely sent to England, the total imports of these mineral phosphates having in some years reached 5000 tons. There is a bed of A., 18 in. thick, of Silurian age, at Llanfyllin in North Wales, which has been extensively worked. A remarkable deposit of a kind of A., or rather rock guano, which has been termed "sombrerite," was discovered some years ago in the small island of Sombrero, situated about 60 m. to the e. of St. Thomas, in the West Indian group. It covers a great part of the island, which is about $1\frac{1}{2}$ m. long. by $\frac{1}{4}$ of a mile in breadth. Mr. A. A. Julien, writing from the spot in 1864, says there "is a natural division of the sombrero guano into two varieties. One of an oolitic structure, of a great variety of colors, and containing, in addition to the bone $3\text{CaO}, \text{PO}_5$ and neutral $2\text{CaO}, \text{PO}_5$ phosphates of lime, the phosphates of alumina, iron, and magnesia, etc. The other variety, generally of a broad concretionary structure, is of a white or yellowish-white color, containing a little carbonate of lime, sulphate of lime, etc., but especially abounds in bone phosphate of lime. It is almost certain that the former more nearly resembles the original deposit, and is the older of the two; while the latter is far more uniform in composition. The guano is interlaminated with ordinary coral limestone." It is now believed that this hard or rock guano has been formed by water filtering through ordinary guano, into the coral rock adjoining, and turning it more or less completely into phosphate of lime. A similar hard guano occurs at Monk's Island, and one or two others in the Caribbean sea. Large quantities have been introduced into Gt. Britain, and still more into the United States, under the name of sombrero guano, and are extensively employed by the manufacturers of artificial manures, in place of ordinary bone-ash. The general treatment to which mineral phosphate is subjected, is to reduce it to powder, and act upon the pulverized matter with sulphuric acid, which renders the phosphoric acid in the A. soluble in water, and thereby facilitates its introduction into the plant. These substances require to be ground to a finer powder, and subjected to a more protracted digestion than bones. In the greater number of cases where the A. or sombrero guano is treated in this way, it is mixed with other manures, such as peruvian guano, blood, or true bones, and thus a complex substance is manufactured, which is much more acceptable to the plant than the simple A. or mineral phosphate itself. The great importance of mineral phosphate, in an agricultural point of view, arises from the fact that no mineral substance possesses more influence over the growth of the edible plants, such as wheat, barley, oats, turnips, etc., than phosphoric acid does; any cheap source of that substance, therefore, is a great boon. The island of Sombrero contains as much phosphatic or bony matter as is present in many millions of oxen, and represents as much manure as would be obtained by the employment of the bones of these cattle. The different varieties of A. contain a little fluoride or chloride of calcium, or both, as well as phosphate of lime. Of these varieties, besides those already mentioned, there are others, as *morocite*, *francolite*, and *asparagus stone*. It occurs both massive and in crystals—which are generally small, and are often six-sided prisms, or six-sided tables, but some very large ones have been brought from Canada. It occurs in some of the tin mines in Cornwall, Saxony, Bohemia, etc., and in rocks of various ages, as mentioned above. It is found of various colors, more or less green, blue or red, sometimes white,

and often gray. The proposal to employ it as a manure first excited much interest in 1856, and began to be enterprisingly carried into effect, with happy results—rocks once deemed most barren being thus rendered conducive to the fertility of soils. In Spain, A. is used as a building stone.

APE, a name commonly given to the tailless monkeys. (See BARBARY APE, CHIMPANZEE, GIBBON, GORILLA, ORANG-OTANG, etc.) It was originally commensurate in signification with monkey, and the terms were indiscriminately used. The origin of the word is uncertain. See MONKEY.

The worship of apes or monkeys has been common among pagan nations from a period of remote antiquity, and still prevails very extensively, being practiced in Japan, in India, and by some of the African tribes. The source of it is perhaps to be found partly in the doctrine of the transmigration of souls, and partly in the qualities which apes have been supposed to possess in a conspicuous degree, and of which they have been made symbolic. An A.'s tooth, kept in a temple in Ceylon, was regarded with extraordinary veneration, and immense wealth was accumulated through the continual offerings of the worshippers; but the temple was plundered, and the tooth carried away by the Portuguese in 1554.

A-PEAK, or **A-PEEK**, a maritime term signifying the position of an anchor when the cable has been drawn so tight as to bring the ship directly over it; the sailors then say that "the anchor is a-peak."

APELDORN, a beautiful village in the Netherlands province of Gelderland, is situated about 17 m. n. from Arnheim, on a canal which joins the river Grift, a branch of the Yssel, by which, and the public roads from Arnheim and Utrecht to Deventer and Zutphen, and by railway, it has much traffic. The Loo, a hunting-lodge of the king, is in the neighborhood. The principal industries are agriculture, making paper, grinding corn, founding copper, manufacturing blankets and coarse woolen cloth, etc. Pop. of A. (1st Jan., '90), 19,190.

APEL LÉS, the most celebrated painter in ancient times, was the son of Pythias, and was probably, in accordance with the statement of Suidas, born at Colophon, on the Ionian coast of Asia Minor; though Pliny and Ovid call him a Coan, and Strabo and Lucian an Ephesian. This, however, may simply refer to the fact that he was made a Burgess of that town. He flourished in the latter part of the 4th c. B.C.; received his first instruction in art in the Ionian school of Ephesus, then studied under Pamphilus of Amphilopolis, and latterly at Sicyon, under Melanthius, and thus he united the fine coloring of the Ionian with the accurate drawing of the Sicyonic school. During the time of Philip, A. visited Macedon, where he became the intimate friend of Alexander the great. It was probably at the Macedonian court that the best days of A. were spent. Pliny relates that on one occasion when Alexander visited A. in his studio, the king exhibited such ignorance of art that A. recommended him to be silent, as the boys who were grinding the colors were laughing at him. But the same story is told of Zeuxis and Megabyzus. He afterwards visited Rhodes (where he was familiar with Protogenes), Cos, Alexandria, and Ephesus. The period of his death is not known; but as he practiced his art before the death of Philip, and as his visit to Alexandria was after the assumption of the regal title by Ptolemy, he probably flourished between 352 and 308 B.C. The most celebrated paintings of A. were his Anadyomene, or Venus Rising from the Sea, with a shower of silver drops falling round her like a veil of gauze, the Graces, and similar subjects; but he cultivated the heroic as well as the graceful style. His ideal portrait of Alexander wielding a thunderbolt was highly esteemed, and preserved in the temple of Diana at Ephesus. With reference to this painting, Alexander said: "There are only two Alexanders—the invincible son of Philip, and the inimitable Alexander of A." A. is said to have left an incomplete painting of Venus, to which no other painter would presume to give the finishing touches. The disposition of A. was remarkably free from envy, and he willingly acknowledged the merits of his contemporaries. Amphion, he said, excelled him in grouping, and Asclepiodorus in perspective, but *grace* was his alone. On coming to Rhodes, and finding that the works of Protogenes were not appreciated by his countrymen, he at once offered him 50 talents for a picture, and spread the report that he intended to sell it again as his own. The industry with which he practiced drawing was so great as to give rise to the proverb, *Nulla dies sine lineâ*. Many other anecdotes are related of A. When his pictures were exposed to public view, he used to place himself behind a picture, to listen to the criticisms of the common people. A cobbler having detected a fault in the shoe of one of his figures, it is stated that A. instantly rectified it; but when the cobbler, on the following day, extended his criticism to the legs, the painter rushed from his hiding-place, and told the cobbler to stick to the shoes, or, in the Latin version, which has become proverbial, "*Ne sutor supra crepidam.*"

APENNINES (Ital. *Appennini*; anciently, Lat. *Mons Apenninus*), a mountain-chain extending uninterruptedly throughout the whole length of the Italian peninsula. It lies between 37° and 44° 30' n. lat., and 7° 40' and 18° 20' e. long., and belongs to the system of the Alps, from which it branches off at the Col de Tenda, near the sources of the Tanaro. From this point, the chain, under the name of the Ligurian A., girdles the gulf of Genoa.

in the immediate vicinity of the sea, and then runs inland to a considerable extent, forming the water-shed between the Adriatic and the Mediterranean, but gradually approaching the east coast, till, in the highlands of the Abruzzi, it is close upon it; after which it takes a south-western direction through Naples, dips under the sea at the strait of Messina, and reappears on the northern coast of Sicily. Recent geographers divide the A. as follows: 1. *The North A.*, from the Col de Tenda in the Maritime Alps to the pass of Borgo San Sepolcro, in the neighborhood of Arezzo, on the eastern border of Tuscany. 2. *The Central A.*, from Arezzo to the valley of Pescara, which flows between the two Abruzzi. 3. *The South A.*, from the valley of the Pescara to cape Spartivento. 4. *The Insular A.*, or the Sicilian range. The leading feature of the A., wherever they approach the coast, is their extraordinarily steep declivities; while in middle Italy and the adjoining portions of upper and lower Italy, long terraced plateaus, lower ranges, and, finally, extensive coast-plains, mark their gradual descent on the west. The general name for these lower ranges is *Sub-Apennine*; but they have a variety of particular designations, such as, the mountains of Carrara and Seravezza, Protomagno and Monte Amiata, in Tuscany; the Sabine, Alban, and Volscian mountains, in the former papal states; Monte Gargano on the s.e. coast, n. of Manfredonia, etc. The main chain of the A. does not send off spurs into the Apulian peninsula, or heel of Italy, which, for the most part, is rather level, or only interspersed with detached groups of hills.

The direction of the great chain of the A. is favorable to the formation, on the w. side, of important river-basins, such as those of the Arno, the Tiber, the Garigliano, and the Volturno; while, on the e. side, we find nothing but small streams, in most cases, destitute of affluents, hurrying down to the sea through wild precipitous valleys. In northern Italy, the Ligurian A., almost overhanging the gulf of Genoa, can only develop on the s. puny streams, while the n. sends down, through the plains of Piedmont, large tributaries to the Po.

The average height of the entire chain of the A. is about 4000 ft., which, however, in the n., sinks down to little more than 3500 ft.; and in the mountains of the Abruzzi, rises to 7000 feet. Here, in Monte Corno, the highest peak of the range known under the name of Gran Sasso d'Italia, they reach an elevation of 10,200 ft., and in Monte Velino of 7850 feet. The North A. attain, in Monte Cimone, situated in the s. of Modena, a height of 6973 ft.; the South A., in Monte Amara, a height of 9000 ft.; the Insular A., if we exclude the isolated peak of *Ætna*, in Pizzo di Case, a height of 6500 feet.

The A. are crossed by 13 principal passes: these are, proceeding from n. to s.—1. The pass of Savona; 2, of Bocchetta; 3, of Cisa; 4, of Monte Cimone; 5, of Porretta; 6, of Pietramala; 7, of Borgo San Sepolcro; 8, of Furlo; 9, of Serravalle; 10, of Aquila; 11, of Isernia; 12, of Arcano and Troja; 13, of Potenza. The prevalent stone is a species of compact limestone, of a whitish-gray color, belonging to the Jura formation. Resting on the limestone is found a more recent formation of sandstone and marl, which is especially abundant in the middle region of the Sub-A., contains an extraordinary number of petrefactions, and must be reckoned as belonging to the upper division of the Parisian limestone. Older formations, however, frequently crop out. Thus, for instance, on the water-shed of the North and Central A. there are found transition clay-slate, grauwacke-slate, etc. The A., especially the Roman and Neapolitan, are distinguished from all other mountain-chains by the rich variety of marbles which they contain. In some places the quarries seem inexhaustible. Volcanic rocks are numerous in the middle and southern regions, where the agency of fire has caused very wonderful formations, as, for instance, the crater-lakes of Albano, Nemi, Vesuvius, Solfatara.

The principal chain exhibits, for the most part, a dreary and barren appearance; it looks like a vast wall, with very few projecting peaks to break the dull monotony of the scene, and therefore seldom furnishes any salient points on which the eye of the spectator can rest with pleasure. Naked, riven, covered with thick *débris*, the declivities seem as if scorched by the southern sun. Only in the Abruzzi, in the sub-A., and above all, in the marble mountains of Carrara and Seravezza, do the bold and magnificent forms of the Alps reappear. Where the A.—in general so poorly supplied with streams—exhibit a trace of Alpine abundance of water, there is no lack of rich pastures and dense forests, but usually only thin grass and wild scrubby bushes cover the stony slopes. The greater number of the roaring forest brooks, in the deep rocky ravines, display, during summer, only a dry bed. Where the mountains dip down to the sea, as at the riviera of Genoa, and the gulf of Naples, a rich, peculiarly southern vegetation clothes the declivities. Gigantic agaves, Indian figs (*cactus opuntia*), myrtle-bushes, orange-groves, hint in these northern lands of the splendors of the tropics. Up to 3000 ft. of elevation, cornfields, fruit-bearing chestnuts, and deciduous oaks are found. Beyond this, all vegetation often ceases on the steep and stony sides of the mountains; but at other times the beech or the fir appears in dense forests. There is no region of perpetual snow; but the summits of the Abruzzi and the lofty peaks of Lunigiana, are often covered with snow from Oct. far into May, and send their icy breath so suddenly down into the mild valleys, that the temperature in a few hours sinks 12° to 18° F., and a warm spring afternoon is succeeded by a bitter Dec. evening.

APENRADE, a t. in the Prussian province of Slesvig-Holstein, situated at the bottom of a gulf in the Little Belt, has an excellent harbor, and a considerable amount of ship-

ping. Pop. about 5200. The environs of the t. are beautiful. The first historical mention made of A. relates to its destruction by the Slaves in 1148; and, indeed, its position has always laid it open to the casualties of northern war, whether on a large or small scale, as has been especially seen since 1848. Near the t. stands the castle of Brundlund, built by queen Margaret in 1411, in which the bailiff of the place resides.

APERIENTS. See LAXATIVES, PURGATIVES.

APETALOUS, a term in botany, applied to flowers or to flowering plants, and signifying that they are destitute of petals or corolla (q.v.). When both the calyx and corolla are wanting, the flower is said to be *achlamydeous* (from the Greek *chlams*, a covering), or naked. The absence of the whorl of petals sometimes occurs in an exceptional manner in orders or genera ordinarily characterized by its presence.

APHANIPTERA, or **APHANOPTERA**, a term applied to an order, sub-order, or family of wingless insects, composed of various species of fleas, forming the family pulicidae, and closely allied to the flies. The common flea may be considered a type. Another is the chigoe of South America, an insect whose burrowing in the flesh produces troublesome ulcers.

APHA'SIA (Gr. *a*, not, and *phasis*, speech) is a term adopted by the eminent French physician, Trousseau, to denote a remarkable symptom of certain conditions of the nervous system in which the patient is more or less unable to express his thoughts in speech. The disease has been casually noticed by many earlier observers, amongst whom Dr. Parry of Bath may be especially noticed; but it was not until within the last 20 years that it has received the attention which its great singularity demands. Before receiving its present name, it had been termed *aphemia* (from *a*, not, and *phemi*, I speak), and *alalia* (from *laleo*, I talk). Voisin, in an elaborate memoir on this subject, published in 1865, observes that it may be due to several causes. It may be congenital or acquired, and in the latter case is due to some form of lesion or injury of the anterior lobes of the brain. This fact was observed as long ago as 1825 by Bouillaud; but in 1861, during a discussion of the anthropological society of Paris, as to whether certain faculties, such as language, are or are not localized in special parts of the brain, Broca advanced the view, that the faculty of language has its seat not only in the anterior lobes, but in the left lobe, and occupies exactly the external left frontal convolution, where the anterior lobe meets the middle lobe immediately in front of the fissure of Sylvius. This singular conclusion was deduced from only two post-mortem examinations which had just occurred at the Bicêtre, but a number of previously published cases supported it; and Dr. Hughlings Jackson, of the London hospital, "has seen about seventy cases of loss or defect of speech with hemiplegia, and in all but one, the hemiplegia was on the right side, indicating disease of the left side of the brain."—*Lancet*, Nov. 26, 1864. Moreover in the two cases which during the year last named proved fatal in the Edinburgh and Glasgow infirmaries, Dr. Sanders and Dr. Gairdner traced the disease to the *exact spot* described by Broca. It may be caused by wounds, tumors of various kinds, including hydatids, or by softening of the left anterior lobe, and has occasionally, but very rarely, been found in association with lesions of other parts of the cerebrum, and even of the cerebellum and spinal cord. According to Voisin, in 146 cases, the left anterior lobe was affected in 140, and the right in only 6 cases. A variety of aphasia has been noticed in typhoid fever and in the first stage of small-pox; also in certain chronic cachexias or intoxications, as for example, in syphilis and chronic alcoholism; and there are cases in which the affection is purely nervous, and results from epilepsy, an overtaxed brain, etc. The patients in whom true aphasia from disease of the brain occurs, are excellently described by Dr. Gairdner in his essay *On the Functions of Articulate Speech, etc.* (Glasgow, 1866). This description, in a condensed form, is as follows: These patients have been the subject of some form of disturbance of the cerebral functions, sometimes with, but sometimes also without a manifest disturbance of the intellect. It may have been epilepsy or apoplexy, in which latter case, as has been already noticed, there is often paralysis, almost invariably on the right side of the body. This paralysis may be of any extent of completeness, but in many cases the patient has such command over the movements of the tongue and lips, as to show that it is not from paralysis his speech is affected. The states of intellect and consciousness are equally variable, the patient occasionally appearing and behaving as if he were in perfect bodily and mental health, except for the aphasia. Moreover, the aphasia itself shows itself in the most varied forms. In the more trivial cases, it is little more than an aggravation of the common defect of forgetting, or being unable to recall the name of a person or thing when wanted. Dr. Gairdner records the case of what he calls "an aphasic," who could conduct an ordinary conversation pretty well, but who could not name the days of the week, and would, for instance, call Monday "the first working-day," and who had forgotten, or could not give utterance to his own name. Sometimes a patient will perfectly articulate such expressions as these: "I want —, I want —, Where's the?" —, almost always stopping short at the name of the object. Sometimes the patient's vocabulary is limited to one or two common words, as "yes" or "no," or perhaps he utters only one or more unintelligible words, as in the case of one of Trousseau's patients, who for four months uttered nothing but "*Cousini*" to every possible

question, unless when in moments of great irritation, and he would then articulate "*Sacon, sacon*"—probably an abbreviation for a French oath. Strange to say, certain aphasics who can articulate absolutely nothing else, can swear with perfect facility. Such exclamations as "Oh!" "Dear me!" "God bless my life!" and "D—n it!" are often the only utterances of these patients. Dr. H. Jackson, in a memoir on aphasia, in the first volume of the *London Hospital Reports*, has made some excellent remarks on this peculiarity, which are well worthy of perusal by all who study mental philosophy. He ingeniously regards an oath not as a part of language, but as "a sort of detonating comma." The general reader may also read with advantage the histories of two cases recorded by Trousseau, in which Frenchmen of high mental capacity, and well acquainted with the disease (one of them an eminent physician in Paris, who had specially studied the diseases of the brain; and the other, Prof. Lordat of Montpellier), have passed through attacks of aphasia, have recovered, and have described their own cases.

Aphasia may be either temporary or persistent; in the former case, being due to loss of nervous energy, congestion, or some other functional disorder; while in the latter case, it is probably associated with disease of structure.

APHELION, that point in the elliptical orbit of a planet which is most remote from the sun. The opposite point, or that nearest to the sun, is styled the **PERIHELION**. At the former point, the swiftness of the planet's motion is least, and begins to increase; at the latter, it is greatest, and begins to decrease. This irregularity of motion is most remarkable in comets whose orbits deviate most from the circle. The motion of the comet of 1680, at its perihelion, was calculated as 137,000 times more rapid than its motion in A. See **APSIDES**.

APHIS, a genus of insects belonging to the order hemiptera, sub-order homoptera—the type of a family called *aphidii*. They are small insects, living by sucking the juices of plants, upon which they may be seen congregated in immense numbers, often doing serious injury, causing the distortion of leaves, and even the blight and decay of the plant. The woolly aphis, or American blight (*A. lanigera*; *eriosoma mali* of Leach), is sometimes very injurious to apple-trees, and when once it has found its way into a garden or orchard, is very difficult of removal. It is a minute insect, "covered with a long cotton-like wool, transpiring from the pores of its body"—"a cottony excretion"—in which it differs from the ordinary aphides, and takes its place in the chinks and rugosities of the bark, multiplying rapidly, extracting the sap, causing diseased excrescences; and, ultimately, the destruction of the tree. It was first observed in England in 1787; but it is uncertain if it was, as has been supposed, accidentally imported from America. The hop-fly (*A. humuli*), and the A. of the turnip and cabbage (*A. brassicæ*), have sometimes caused the destruction of entire crops. The price of hops varies from one year to another, very much according to the numbers in which "*the fly*" has appeared. The potato A. (*A. vastator*) has been represented as the cause of the potato disease; but this opinion has few supporters. The aphides of the rose (*A. rosæ*) and of the bean (*A. fabæ*) are among the most familiarly known. Every one must have observed the leaves of trees and shrubs deformed by red convexities. In the hollows of the under side of these, aphides have their habitation, and there they find their food; the exhausted leaf at last curls up. Most of the species are green; the A. of the bean is black. They are generally called plant-lice. They have a proboscis (*haustellum*), by which they pierce and suck plants; and at the extremity of the abdomen, two horn-like processes, from which exude frequent small drops of a saccharine fluid called *honey-dew*, a favorite food of ants. It has been seen even to fall in a kind of shower from trees much covered with aphides. Mention has been made in the article **ANT**, of the means which ants take to obtain this food. The legs of aphides are long, and they move slowly and awkwardly by them. The greater number of them never have wings; it is in the autumn that perfect winged insects generally appear. From the pairing of these result eggs, which produce female aphides in the following spring, and successive generations of wingless aphides are produced in a viviparous manner without impregnation throughout the summer, after which winged aphides again appear. Their increase is restrained not only by birds, but by insects which feed on them. A family of coleopterous insects, to which the genus *coccinella* or lady-bird (q.v.) belongs, has received upon this account the name of *aphidiphagi*, or aphid-eaters.

APHONIA (Gr. *a*, not, and *phonè*, voice) is the term used in medicine to signify a more or less complete loss of voice. It is altogether distinct from mutism, in which it is impossible to form articulate sounds, and in most cases the voice is not entirely gone, but only more or less lost or suppressed. The voice is essentially produced (as has been proved in the special article on that subject) by three distinct agents—viz., (1) the expiration of air, (2) the opening of the glottis, and (3) the tension of the vocal cords—and hence anything interfering with expiration, or with the functions of the glottis and vocal cords, may cause aphonia. Thus, it may result from paralysis of the respiratory muscles, from pulmonary emphysema, and sometimes from pneumonia; or it may be caused by diseases of the larynx, as chronic laryngitis, œdema of the glottis, polypus, etc.; or by pressure on the larynx caused by abscesses, vegetations, and any kind of morbid growth; or it may be traced to some functional or organic disturbance of the inferior vocal cords. Thus, the muscular fibres which act on these cords may become affected in acute laryngitis by extension of the inflammation, or their action may be impeded by the

pressure of false membrane in croup. In typhoid fever, the aphonia which is so commonly observed is due to ulceration extending to these structures. Again, in cases of lead or phosphorus poisoning, there is aphonia due to fatty degeneration of the muscles. Not unfrequently, aphonia may be traced to compression of the recurrent or inferior laryngeal nerve, which is the nerve supplying motor power to all the muscles of the larynx, with one trifling exception.

Such pressure is not unfrequently caused by an aneurism, an abscess, tumor, etc. In the same way, a wound or contusion of the pneumogastric nerve, or one of the recurrent branches, will cause aphonia, or, more commonly, an extremely hoarse modification of the voice, in consequence of the laryngeal muscles being paralyzed on one side, and remaining active on the other. There are cases of direct nervous action being interfered with; but there are many cases of what may be termed *reflex aphonia*, as when the voice is often more or less lost in the course of pregnancy when accompanied with convulsions, or in consequence of the presence of intestinal worms, or after the rapid suppression of an exanthematous rash, or of a long-continued hemorrhagic discharge. Aphonia is, moreover, very commonly associated with hysteria.

When aphonia is not due to irremovable causes, as tumors pressing on the recurrent nerve, fatty degeneration of the laryngeal muscles, etc., it generally disappears after a longer or shorter interval. It occasionally assumes remarkable intermittent shapes. In one instance, the affection came on regularly at the same time of the year for 17 years, beginning daily at noon, and lasting the remainder of the day, for a period varying from 3 to 7 months.* Another case is recorded in which during 14 years, a young woman could only speak during two or three hours daily.

In those cases which are amenable to treatment, emetics, electricity, strychnine, leeching, blistering, croton-oil liniment, and internal application of nitrate of silver, have been found to be the most useful remedies.

APHORISM, a maxim, or any short and significant saying; such as, "custom is a second nature." A whole piece or work is sometimes written in the form of a series of aphorisms, arranged in due order, and leaving their connection to be traced by the reader's reflection.

APHRODISIA. A name given to the festivals of Aphrodite (q.v.) in Greece, and especially in Cyprus, the chief seat of her worship, and at Cythera, Corinth, Thebes, Elis, and Sparta. At these festivals no blood-offerings were made, but only pure fire, incense, and flowers. The name is also given to the mysteries celebrated in honor of Aphrodite in Paphos.

APHRODISIACS. A name generally used in medicine of those drugs that excite erotic desire, though the name, strictly used, may also include any psychical or mechanical means employed for the same purpose. All drugs that are tonic in their effects and which promote the health of the body are indirectly aphrodisiac in their tendency. Such are strychnine, iron, quinine, etc. True aphrodisiacs are very rare, and it is in fact doubtful if there be any whose use is not injurious if given in effective doses. Such are hasheesh (*cannabis Indica*), cantharides (a violent and dangerous irritant), *blatte Orientalis*, and damiana, a preparation made from a species of Turnera found in Mexico. Drugs which have the contrary effect are called antaphrodisiacs and anaphrodisiacs. Such are the bromides, ergot, and camphor. See **ANAPHRODISIACS**.

APHRODITOPOLIS. The name of several cities in ancient Egypt under the Greeks.

APHRODITE, the Greek name of Venus, according to various traditions, is derived from *aphros* (foam), in allusion to the old poetical myth which represented the goddess as springing from the foam of the sea. (See **VENUS** and **APELLES**.) *Aphrodisia* were festivals celebrated in honor of A. in numerous cities of Greece, but especially in Cyprus. At Paphos, in this island, was her most ancient temple. Bloodless sacrifices alone were imagined to please A., such as flowers, incense, etc. Mysteries of an impure kind formed part of the ceremonial of the aphrodisia. Aphrodisia were no doubt held in the other places where A. was worshiped, such as Cythera, Sparta, Thebes, Elis, etc., though they are not mentioned. At Corinth and Athens, the aphrodisia were celebrated principally by prostitutes. There are famous statues of Aphrodite at Paris (usually called the Venus di Milo), at Florence (the Venus de' Medici), and at Rome (the Capitoline Venus). Among the Phœnicians, Aphrodite was known as Astarte, and among the Assyrians as Istar. Her attendant was Eros (Cupid). See **MYTHOLOGY**.

APIA, the principal city in the Samoan Islands, South Pacific ocean. During President Grant's administration, a sort of American protectorate was established over the islands, which subsequently gave way in 1886 to German occupation, notwithstanding both England and the United States had large interests there. The natives preferred American to German protection, and dissensions soon arose between them and the German consul. These increased until, in 1888, a kind of civil war began to rage. The question of the government of Samoa, as the islands were also called, then became one requiring diplomatic action. The United States, England, and Germany met by their representatives in convention, in Berlin, and a new treaty was signed, June 14,

1889. In the mean time, three American men-of-war, one English, and three German were in the harbor. A hurricane suddenly burst over the region, and raged with unexampled fury. Only the English vessel escaped to sea. The others were nearly all wrecked, and a loss of 146 lives involved. See NAVIGATORS' ISLANDS.

A PIARY. See BEE.

APICIUS, MARCUS GABIUS, a Roman epicure, who lived in the times of Augustus and Tiberius, and was celebrated for his luxurious table and his acquirements in the art of cookery. When, by the gratification of his favorite indulgence, he had consumed the greater part of his fortune, and had only some \$400,000 left, he poisoned himself, in order to avoid the misery of plain diet. Two other gourmands—one in the time of Pompey, the other in the reign of Trajan—are mentioned under the name Apicius. The Roman cookery-book, *Culii Apicii de Obsoniis et Condimentis sive de re Culinariâ* (libri decem), ascribed to A., belongs to a much later time, inasmuch as it abounds in inaccuracies and solecisms.

APION, a Greek grammarian, was born at Oasis, a t. in Libya, but educated in Alexandria, which he affected to consider his birthplace, from a desire of being thought a pure Greek. He studied under Apollonius, the son of Archibius, from whom he acquired an admiration of Homer, and afterwards went to Rome, where he succeeded Theon as teacher of rhetoric. He seems to have been as remarkable for his loquacious vanity as for his knowledge. He declared that himself, and every one whom he mentioned, would be held in immortal memory, that he was equal to the first philosophers of Greece, and that Alexandria should be proud of him. From his bragging, Tiberius used to call him *cymbalum mundi* (the cymbal of the universe).

With the exception of one or two fragments, the whole of A.'s numerous writings are lost. He composed a work on the text of Homer, partly in the form of a dictionary, which was frequently referred to by subsequent authors; a work on Egypt, which contained the far-famed story of *Androclus and the Lion*, preserved by Aulus Gellius; a work against the Jews; one in praise of Alexander the Great; another on the great epicurean Apicius; histories of various countries, etc.

APIS, the bull worshiped by the ancient Egyptians, who regarded it as a symbol of Osiris, the god of the Nile, the husband of Isis, and the great divinity of Egypt. A sacred court or yard was set apart for the residence of A. in the temple of Ptah at Memphis, where a numerous retinue of priests waited upon him, and sacrifices of red oxen were offered to him. His movements, choice of places, and changes of appetite were religiously regarded as oracles. It was an understood law that A. must not live longer than 25 years. When he attained this age, he was secretly put to death, and buried by the priests in a sacred well, the popular belief being that he cast himself into the water. If, however, he died a natural death, his body was solemnly interred in the temple of Serapis at Memphis, and bacchanalian festivals were held to celebrate the inauguration of a new bull as A. As soon as a suitable animal was found having the required marks—black color with a white square on the brow, the figure of an eagle on the back, and a knot in the shape of a cantharus under the tongue—he was led in triumphal procession to Nilopolis at the time of the new moon, where he remained forty days, waited upon by nude women, and was afterwards conveyed in a splendid vessel to Memphis. His theophany, or day of discovery, and his birthday, were celebrated as high festivals of seven days' duration during the rise of the Nile.

APIS, APIDÆ. See BEE.

APIUM. See CELERY.

APLANATIC LENS, an achromatic lens corrected for spherical aberration, so that all rays of light which emanate from one point and pass through the lens, are focused at a point.

APOCALYPSE. See REVELATION OF ST. JOHN.

APOCALYPTIC LITERATURE, alleged prophecies, epistles, etc., of late Jewish and early Christian origin, written or compiled in or near the two centuries preceding and the two following the birth of Christ. Of the Jewish, the most famous is the *Book of Enoch*, quoted in the epistle of Jude, long lost, but found in Ethiopia and published in 1821. It gives an account of the fall of the angels, their intercourse with the daughters of men, and the birth of giants; Enoch's troubles in heaven and earth, attended by angels who explain the mysteries of the worlds, visible and invisible; descriptions of heaven, of the Messiah, of the future of the blessed, and of the condemned; accounts of the sun, moon, and stars; visions tracing the history of man from his origin to the completion of the Messianic kingdom; admonitory discourses; the wonders that were shown at Noah's birth, and Enoch's reflections about the future of the just and the unjust. In all, it is an interesting product of pre-Christian Judaism, multifarious, artificial, and rabbinical. The *Fourth Book of Esdras*, or the *Prophecy of Ezra*, consists of a series of visions attributed to that prophet, and relating chiefly to the oppression of the Jews. The *Book of the Jubilees*, or the *Little Genesis*, is only in part apocalyptic. It contains, in the form of revelations to Moses while he was on Mt. Sinai, statements relating to future races and times. The work was written about 100 B.C. The *Life of Adam*, the *Book of Adam's Daughters*, the *Assumption of Moses*, the *Apocalypse of Moses*, the *Sibyllines*, and the *Apocalypse of Baruch*, complete the list of noteworthy Hebrew works of the kind under consideration. The *Sibyllines* were doubtless sug-

gested by the Grecian oracles and books under that name. The Christian A. works are: the *Apocalypse of Esdras*, in which the prophet is anxious about the punishment of the wicked, and minutely describes them as tormented; the *Apocalypse of Paul*, giving a description of all that the apostle saw in heaven and hell; the *Apocalypse of John*, describing the future state, resurrection, judgment, punishment, and reward. This work was written as late as the 5th or 6th century. The *Apocalypse of Peter* is a history of events from the creation to the second advent of Christ, and is said to have been written by Clement, Peter's disciple. It is a late work, mentioning the crusades. Another late work is the *Revelations of Bartholomew*, in which Peter is made the archbishop of the universe, a fact that of itself gives the work a late origin. The *Apocalypse of Mary* described her descent into hell. The *Apocalypse of Daniel* is of little consequence. The *Discussion and Visions of Isaiah* assumes that the prophet had a vision of the life and crucifixion of Christ, the apostasy of the early churches, etc., for which prophecy Isaiah was condemned and died a martyr. The book was written about the 2d century. Other books of the kind are the *Shepherd of Hermas* and the *Testaments of the Twelve Patriarchs*. Many A. writings, both Jewish and Christian, mentioned in ancient works, are otherwise entirely unknown.

APOCALYPTIC NUMBER is "the mystical number" 666, spoken of in the book of Revelation (xiii. 18). As early as the 2d c., the church had found that the name Anti-christ was indicated by the Greek characters expressive of this number; while others believed it to express a date. The most probable interpretation is that which was current in the days of Irenæus, and which found the number in the word *Latēinos* (*Latinus*). The Roman nation—the mightiest pagan power on earth—was the most terrible symbol of Antichrist, and the number 666 appears in the Greek characters which spell the name. Protestant controversialists formerly used this interpretation, applying the prophecy to papal Rome; but modern criticism leaves the problem unsolved.

APOCARPOUS FRUITS, in botany, are those fruits which are the produce of a single flower, and are formed of only one carpel, or of a number of carpels remaining free and separate from each other. The term is derived from the Greek *apo*, implying separation, and *carpos*, fruit.

A POCO A POCO (Ital.), in music, by degrees; by little and little.

APOCRENIC ACID is one of the products of the natural decay of wood and other plant textures, and is found wherever lignine or woody fiber is decomposing in soils, etc. As A. A. is soluble in water, it follows that rain-water falling on and percolating through soils containing this substance, becomes impregnated with it; and hence, in many natural waters, A. A. is a recognized constituent. A. A. performs an important function in the growth of plants, as there is every reason to believe that it forms one of the stages through which matter travels from dead plants again into the living vegetable tissue.

APOC'RYPHA, or **APOCRYPHAL WRITINGS**. The word originally meant *secret* or *concealed*, and was rendered current by the Jews of Alexandria. In the earliest churches, it was applied with very different significations to a variety of writings. Sometimes it was given to those whose authorship and original form were unknown; sometimes to writings containing a hidden meaning; sometimes to those whose public use was not thought advisable. In this last signification, it has been customary, since the time of Jerome, to apply the term to a number of writings which the Septuagint had circulated amongst the Christians, and which were sometimes considered as an appendage to the Old Testament, and sometimes as a portion of it. The Greek church, at the council of Laodicea (360 A.D.), excluded them from the canon; the Latin church, on the other hand, always highly favored them; and finally the council of Trent (1545-63) placed them on an equality with the rest of the Old Testament. The church of England uses them in part for edification, but not for the "establishment of doctrine." All other Protestant churches in England and America reject their use in public worship. But it was once customary to bind up the A. between the authorized versions of the Old and New Testaments, though this has now ceased, and, as a consequence, this curious, interesting, and instructive part of Jewish literature is now known only to scholars. The Old Testament A. consists of 14 books: 1. First Esdras (q.v.); 2. Second Esdras (q.v.); 3. Tobit (q.v.); 4. Judith (q.v.); 5. The parts of Esther not found in Hebrew or Chaldee; 6. The Wisdom of Solomon; 7. The Wisdom of Jesus, son of Sirach, or Ecclesiasticus (q.v.); 8. Baruch (q.v.); 9. The Song of the Three Holy Children; 10. The History of Susanna; 11. The History of the Destruction of Bel and the Dragon (q.v.); 12. The Prayer of Manasses, King of Judah (see MANASSEH); 13. First Maccabees (q.v.); 14. Second Maccabees (q.v.). The precise origin of all of these writings cannot be ascertained. It is enough to state here that some bear traces of a Palestinian, others of an Egypto-Alexandrine, and others, again, of a Chaldaico-Persian origin or influence. Most, if not all, bear internal evidence of having been composed in the 1st and 2d c. B.C.

The A. of the New Testament may be arranged under three heads. 1. The writings comprising the *Apocryphal Gospels*, which consist of 22 separate documents, 10 in Greek and 12 in Latin. They concern themselves with the history of Joseph, and of the Virgin Mary before the birth of Christ, with the infancy of Christ, and with the history of Pilate. The most important of the set are the *Proterangelium of James*, the *Gospel of Thomas*, and the *Acts of Pilate*, which are perhaps the *origines* of all the apocryphal tra-

ditions. That many of the stories found in these were current in the 2d. c., is abundantly proved, but we have no evidence that any of the books known as Apocryphal gospels were then in existence, or are older than the 4th century. 2. The *Apocryphal Acts of the Apostles*, consisting of 13 documents originally written in Greek, but found also in a Latin compilation probably of the 6th century. They are distinguished from the Apocryphal gospels by having less of miracle and more of didactic discourse. The more important of the collection are *The Acts of Peter and Paul*, *The Acts of Barnabas*, *The Acts of Philip*, *The Acts of Andrew*, *The Acts of Bartholomew*, and *The Acts of John*. It is difficult to ascertain their age. Some are probably of earlier date than the Apocryphal gospels, but the original MSS. are lost, and we only possess them in late transcripts of the middle ages. 3. The *Apocryphal Apocalypses*, consisting of 7 documents, 4 of which are called apocalypses by their authors. There is great and perplexing variety in the MSS. That called *The Apocalypse of Moses* relates rather to the Old Testament than to the New; so does *The Apocalypse of Esdras*, which is a weak imitation of the fourth book of Esdras. The others are *The Apocalypse of Paul*, *The Apocalypse of John*, and *The Assumption of Mary* in three forms. These, too, only exist in late MSS. of the middle ages, and it is, of course, not quite certain that they are the same in form as the works bearing the same name referred to in the writings of the fathers. See ACTS, SPURIOUS OR APOCRYPHAL.

APCCYNA'CEE, or **APOCYN'E**, a natural order of dicotyledonous plants, consisting of trees and shrubs, generally with milky juice, having entire leaves, and no stipules. The calyx is usually 5-partite, persistent; the corolla hypogynous, monopetalous, often with scales in its throat, regular, 5-lobed, twisted in bud. There are five stamens, which are inserted on the corolla; the anthers adhere firmly to the stigma, to which the pollen is immediately applied; the anthers are 2-celled, and open longitudinally; the pollen is granular. The ovaries are two, each 1-celled, or one which is 2-celled; ovules usually numerous; styles 1 or 2; the stigma is contracted in the middle, and peculiarly characteristic of the order. The fruit is a follicle or capsule, or drupe or berry, double or single. The seeds have a fleshy or cartilaginous albumen, or (rarely) are ex-albuminous.—There are about 566 known species, chiefly natives of tropical countries. The **PERIWINKLE** (q.v.) is its only representative in the flora of Britain, a wanderer, as it were, from the tropics, yet hardy enough for the climate with which it has to contend; the **OLEANDER** (q.v.) and a few others are found in the s. of Europe. Many species are poisonous; amongst which is the noted **Tanghin** (q.v.) or **TANGHEENA** of Madagascar. Some are used in medicine, in India and other countries. A number of species yield **Caoutchouc** (q.v.). The milk of others is bland and wholesome, as the **Hya Hya** or **Cow-tree** (q.v.) of Demerara. Some are used in dyeing; *Wrightia tinctoria* yields indigo of good quality.—A number yield eatable fruits, as *Willughbeia edulis* and *Carissa Carandas* in India; *Carissa edulis* in Arabia, and certain species of *Carpodinus*, called **PISHAMIN** in Sierra Leone, and *Hancornia*.—*Apocynum cannabinum*, Canadian hemp, a herbaceous plant about 4 to 5 ft. in height, with unbranched stem, oblong leaves, and lateral cymes of whitish bell-shaped flowers, yields a very strong fiber, which the Indians of North America employ for making twine, cloth, fishing-nets, etc.

APODIC'TIC, a logical term signifying a judgment or conclusion which is necessarily true; or, in other words, a judgment of which the opposite is impossible. No A. judgment can be founded on experience, because experience does not supply the idea of an absolute necessity.

AP'OGEE (Gr. *apo*, from, and *ge*, the earth), properly speaking, the greatest distance of the earth from any of the heavenly bodies. Its application, however, is restricted to the sun and moon, the sun's A. corresponding to the earth's aphelion, and the moon's A. being the point of its orbit most remote from the earth. A. is opposed to perigee.

APOL'DA, a t. of the grand duchy of Saxe-Weimar-Eisenach, Germany, on the Werlitz, a feeder of the Saale, 8 m. n.e. from Weimar. It is a station on the Thuringian railway, between Weimar and Weissenfels. It is a place of much industrial activity, having extensive manufactures of hosiery. Pop. '90, 20,880.

APOLLINA'RIS, the younger, bishop of Laodicea in Syria (362), and one of the warmest opponents of Arianism. Both as a man and a scholar, he was held in the greatest reverence; and his writings were extensively read in his own day. His father, A. the elder, who was presbyter of Laodicea, was b. at Alexandria, and taught grammar, first at Berytus, and afterwards at Laodicea. When Julian prohibited the Christians from teaching the classics, the father and son endeavored to supply the loss by converting the Scriptures into a body of poetry, rhetoric, and philosophy. The Old Testament was selected as the subject for poetical compositions after the manner of Homer, Pindar, and the tragedians; whilst the New Testament formed the groundwork of dialogues in imitation of Plato. It is not ascertained what share the father had in this work, but as he had a reputation for poetry, he probably put the Old Testament into Greek verse. But it was chiefly as a controversial theologian, and as the founder of a sect, that A. is celebrated. He maintained the doctrine that the *logos*, or divine nature in Christ, took the place of the rational human soul or mind, and that the body of Christ was a spiritualized and glorified form of humanity. This doctrine was condemned by several synods, especially by the council of Constantinople (381), on the ground that it denied the true human nature of Christ. The heresy styled Apollinarianism spread itself rapidly in Syria and the

neighboring countries, and, after the death of A., divided itself into two sects—the Vitalians, named after Vitalis, bishop of Antioch; and the Polemeans, who added to the doctrine of A. the assertion that the divine and human natures were so blended as one substance in Christ that his body was a proper object of adoration. On this account they were accused of *sarcolatry* (worship of the flesh) and *anthropolatry* (worship of man), and also were styled *synousiastoi* (*syn*, together, and *ousia*, substance), because they confused together the two distinct substances.

APOLLINARIS WATER, from a spring in the valley of the Ahr, in Rhenish Prussia, is used largely as a beverage, alone or mixed with wine, and, to some extent, medicinally as an alkaline remedy. The following table shows an average of eight analyses by Bischof and Mohr :

Sodium Carbonate,	6.964	grains in a pint.
Magnesium “	2.751	“ “ “ “
Calcium “	1.900	“ “ “ “
Sodium Chloride,	2.743	“ “ “ “
“ Sulphate,	1.548	“ “ “ “
Sodium Phosphate,	} Traces.	
Potassium Salts,		
Iron Oxide, with Alumina,	0.049	grains in a pint.
Silicic Acid,	0.099	“ “ “ “
Carbonic “	{ free and semi-	
“ “		
“ “	combined,	42.81 cub.in. “ “ “
“ “	(combined),	12.44 “ “ “ “

APOLLO (Gr. APOLLON). A. may be regarded as the characteristic divinity of the Greeks, inasmuch as he was the impersonation of Greek life in its most beautiful and natural forms, and the ideal representative of the Grecian nation. His mild worship, with its many festivals, accompanied as they were by a cessation from all hostilities; his various shrines at sacred places, with their oracles, and the general idea of his character, had a wide, powerful, and beneficent influence on social and political life throughout the states of Greece. Homer and Hesiod mention that he was the son of Zeus and Leto, but neither states where he was born. The Ephesians believed that both he and Diana, his sister, were born in a grove near their city. The Tegyrians of Boeotia, and the inhabitants of Zoster in Attica, also claimed the honor of his birth; while the Egyptians seemed to think he properly belonged to them; but the most popular legend was that which made him a native of Delos, one of the Cyclades, where his mother Leto, followed by the jealous wrath of Juno over land and sea, at length found rest and shelter, and was delivered of him, under the shadow of an olive-tree, at the foot of Mt. Cynthus. To spite the queen of heaven, who was far from being a favorite with the other goddesses, these hastened to tender their services to the weak and wearied Leto. The young A. was much made of. Themis fed him with nectar and ambrosia, the food of the gods, which seems to have suddenly excited the conceit of the infant deity, inasmuch as he surprised his nurse by starting to his feet, demanding a lyre, and announcing his intention of henceforth revealing to mortals the will of Jove.

In ancient literature A. is described as possessed of many and various powers, all of which, however, are seen on closer inspection to be intimately related to each other. He is spoken of: 1. The god of retributive justice, who, armed with bow and arrows, sends down his glittering shafts upon insolent offenders. In this character he appears in the opening of the *Iliad*. 2. As the instructor of bards, and the god of song or minstrelsy, playing upon the phorminx or seven-stringed lyre, and singing for the diversion of the other deities when engaged in feasting. 3. As the god of prophetic inspiration, especially in his oracle at Delphi. 4. As the guardian deity of herds and flocks. 5. As the god of medicine, who affords help, and wards off evil. In this sense he is represented as the father of Asclepius (*Æsculapius*), the god of the healing art. 6. As a founder of cities. According to Homer, he assisted Neptune in building the walls of Troy. Cyrene, Naxos in Sicily, and other cities, venerated A. as their founder. By the later writers, A. was identified with Helios, the sun-god, though Homer describes the latter as a distinct deity. Several critics, however, have regarded Helios, or the sun-god, as the true original A.—an opinion which may be supported by many probabilities. The supposition that A. was identical with the Egyptian deity Horus was rejected by the learned O. Müller, who generally opposed all attempts to deduce Grecian from Egyptian mythology. According to Müller's theory, A. was a purely Doric deity, whose first residence was in Tempe, and who afterwards removed to Delphi, whence the fame of his oracle was spread abroad, and made him to be recognized as the national divinity of Greece. The introduction of his worship into Attica appears to have been contemporaneous with the immigration of the Ionians, and that worship would seem to have spread over the Peloponnesus, immediately after it was conquered by the Dorians. Much controversy has taken place, both with reference to the idea which lies at the root of the whole myth of the A. worship, and also as to whether this myth had its origin in the north of Greece or in Egypt. Even on the supposition that the original conception was derived from the latter source, it was to Greek art and philosophy that it owed its development into the ideal of humanity. The most celebrated oracles of A. were at Delphi, Abæ in Phocis, Ismenior in Thebes.

Delos, Claros, near Colophon, and Patara in Lycia. Among the Romans, the worship of A. was practiced as early as 430 B.C., and prevailed especially under the emperors. But there can be no doubt that the Romans derived their conceptions of A. entirely from the Greeks. It was in honor of A. and his sister Diana that the *ludi sæculares* were celebrated every hundred years. The attributes of A. are the bow and quiver, the cithara and plectrum, the snake, shepherd's crook, tripod, laurel, raven, etc.; less frequently, the grasshopper, cock, hawk, wolf, and olive-tree. In sculpture, he is generally represented with a face beautifully oval, high forehead, flowing hair, and slender figure. See *illus.*, MYTHOLOGY, vol. X.

APOLLO BELVEDERE, a celebrated statue of antiquity, which has generally been regarded as embodying the highest ideal of manly beauty. It is generally supposed to represent the "lord of the unerring bow" in the moment of his victory over the Python, but numerous other explanations have been suggested. The figure (upwards of 7 ft. in height) is naked, but a cloak fastened round the neck hangs gracefully over the extended left arm; the expression of the face is one of calm and godlike triumph, mixed with "beautiful disdain." This great work of art was discovered in 1503, amid the ruins of the ancient Antium, now Capo d'Anzo, and purchased by pope Julius II., who placed it in the Belvedere of the Vatican, whence the name it bears. The date of its execution is with probability referred to the reign of Nero, but the name of the artist is a matter of mere conjecture. The left hand and the right forearm, wanting in the statue as discovered, were restored by G. A. da Montorsoli, a pupil of Michael Angelo. See *illus.*, SCULPTURE, vol. XIII.

APOLLODORUS, an Athenian painter who flourished about 408 B.C., and was the predecessor of Zeuxis. He introduced improved coloring and distribution of light and shade.—A., a celebrated architect in the time of the emperor Trajan, by whom he was employed to construct a bridge over the Danube in lower Hungary. His severe censure, boldly pronounced on a design for a temple of Venus, which the emperor Hadrian had sent to him, caused A. to be sentenced to death in 129 A.D.—A., a Greek grammarian, lived about 140 B.C., studied philosophy in Athens, and grammar under Aristarchus; wrote a work on mythology, giving an arrangement of old myths from the earliest times to the historical period; also a geography, a chronicle in iambic verse, and several grammatical works. The mythology, which begins with the origin of the gods, probably went down as far as the Trojan cycle, but a portion of it has perished. The work is one of great value to classical scholars.

APOLLO'NIA, the name of several ancient cities: 1. In Illyria, on the Aous, founded by emigrants from Corinth and Corcyra, commercially prosperous, and toward the end of the Roman empire, a seat of literature and philosophy. 2. In Thracia (afterwards Sozopolis, and now Sizeboli), colonized by Milesians, and famous for a statue of Apollo, which was removed to Rome. 3. The port of Cyrene (afterwards Sorsusa, and now Marsa Sousah), which outgrew Cyrene itself, and left evidences of its magnificence in the ruins of its public buildings. This A. was the birthplace of Eratosthenes.

APOLLO'NIUS, the name of several celebrated Greek grammarians and rhetoricians. A., surnamed *Dyscolos* (or ill-tempered), of Alexandria, lived in the 2d century. Some of his grammatical works were edited by Bekker. A. was the first who reduced grammar to a system. His reputation was so high, that Priscian calls him *grammaticorum princeps* (the prince of grammarians).—A., son of Archebulus, also of Alexandria, lived in the time of Augustus, and was the author of a lexicon of Homeric words.—A., surnamed Molon, was a teacher of rhetoric at Rhodes, and also gave lectures at Rome, where he was highly esteemed by Cicero and Cæsar.—A. of PERGA, 240 B.C., is classed with Euclid, Archimedes, and Diophantus, as one of the founders of the mathematical sciences. His work on conic sections has been preserved, partly in the original Greek, partly in an Arabic translation. A. of RHODES (or of Alexandria, say some authorities), b. 235 B.C., wrote many works on grammar, and an epic poem, entitled the *Argonautica*, marked rather by learning and industry than by poetical genius, though it contains some truly artistic passages, such as those exhibiting the growth of Medea's love. It was greatly admired by the Romans, was translated into Latin by Publius Terentius Varro, and was imitated, not only in a wholesale manner by Valerius Flaccus, but even by Virgil in some passages. Standard edition by Merkel (1834).

APOLLO'NIUS, of TYANA, in Cappadocia, who lived in the time of Christ, was a zealous follower of the doctrines of Pythagoras. He soon collected a considerable number of disciples, traveled through a great part of Asia Minor, and endeavored to find his way to India, in order to become acquainted with the doctrine of the Brahmins. On this journey he stayed for a time in Babylon, was introduced to the Magi, and at last reached the court of king Phraortes, in India, who recommended him to Jarchas, the principal Brahmin. When A. returned from this pilgrimage, his fame as a wise man was greatly increased; the people regarded him as a worker of miracles and a divine being, and princes were glad to entertain him at their courts. He himself seems to have claimed insight into futurity, rather than the power of working miracles. From Rome

he was expelled on a charge of having raised a young woman from the dead. After extensive travels in Spain, Italy, Greece, and Ethiopia, he was accused of having taken part in an insurrection against Domitian; but appeared before the tribunal, and was acquitted. Ultimately, he appears to have settled in Ephesus, where he opened a Pythagorean school, and continued his teaching until he died, nearly 100 years old. His history was written about 100 years after his death by Philostratus (q.v.). It contains a mass of absurdities and fables, through which an outline of historical facts and the real character of the man are sufficiently discernible. Hierocles, a heathen statesman and opponent of Christianity, wrote, in the 3d c., a work on the life and doctrines of A., with a view to prove their superiority to the doctrine of Christ. In modern times, the notorious English freethinker Blount, and Voltaire in France, have renewed the attempt. See Gildersleeve's *Essays and Studies* (1881); and Dyer's *Gods in Greece* (1891).

APOLLONIUS, of TYRE, the hero of a Greek romance, which enjoyed great popularity in the middle ages, and was translated into almost all the languages of western Europe. In it are related the romantic adventures which befell A., a Syrian prince, previous to his marriage with the daughter of king Alcistrates, of Cyrene. To these are added the adventures of his wife, who was parted from him by apparent death, as well as those of his daughter Tarsia, who was carried off by pirates, and sold in Mitylene. The poem closes with the reunion of the whole family. The original Greek work no longer exists; but there are three very early Latin versions, of which one was published by Welsch (Augsburg, 1595); another is to be found in the *Gesta Romanorum*; and the third in the *Pantheon* of Gottfried of Viterbo. From this Latin source have proceeded the Spanish version of the 13th c., printed in Sanchez's *Collecion de Poesias Castellanas* (2d edition, Paris, 1842), several French versions, in prose and verse, as well as several Italian. As early as the 11th c. there was an Anglo-Saxon adaptation of the work, and subsequently various English ones appeared. Shakespeare has treated the subject in his drama of *Pericles*; he substantially follows Gower, in his *Confessio Amantis*, who bases his narrative on the *Pantheon* of Gottfried of Viterbo. Three popular English stories, drawn from a French version of this romance, appeared in London in 1510, 1576, and 1607; while the Dutch, in 1493, derived theirs from the German. The romance was rendered into German, probably from the *Gesta Romanorum*, by a certain "Heinrich von der Neuenstadt" (i.e., Vienna), about the year 1300, in the form of a long and, as yet, unpublished poem. Later, we have a *Histori des Küniges Appolonii*, translated from Gottfried of Viterbo, and first published at Augsburg in 1476. Simrock, in his *Sources of Shakespeare*, narrates the story as it is given in the *Gesta Romanorum*. A modern Greek translation of the Latin romance, undertaken in 1500 by Gabriel Contianus of Crete, and several times reprinted at Venice, must not be confounded with the lost Greek original.

APOLLOS, a learned Jew from Alexandria, who came to Ephesus during the absence of St. Paul and preached the doctrine of Christ. At Corinth he taught the Jews from their scriptures that Jesus was the Christ. There was a division in the church at Corinth, and one of the parties took his name, but without his authority, for he was always friendly with St. Paul and preached the doctrines of the apostles. An uncertain tradition makes him bishop of Cesarea. Luther's conjecture that A. was the author of the epistle to the Hebrews, favored by some scholars of eminence, remains without proof.

APOLLYON, used (Rev. ix. 11) to translate the Hebrew *Abaddon*, which means "destruction," and thence, the place of the dead; perhaps nearly equivalent to Hades with the Greeks. A. is personified as the angel having dominion over the bottomless pit; as a destroying power, appearing in the forms of beasts at the sound of the fifth trumpet. In the *Pilgrim's Progress* A. is the evil spirit encountering Christian in the valley of the shadow of death.

APOLOGUE, a fable, parable, or short story, intended to serve as a pleasant vehicle of some moral doctrine. One of the oldest and best apologues or parables is that by Jotham, as given in the book of Judges (ix. 7-15). Another celebrated A. is that of the "limbs and the body," related by the patrician Menenius Agrippa. Æsop's fables have enjoyed a world-wide reputation. Luther held such an opinion of the value of the A. as a vehicle of moral truth, that he edited a revised Æsop, for which he wrote a characteristic preface. He says: "In doing this, I have especially cared for young people, that they may receive instruction in a style suitable to their age, which is naturally fond of all kinds of fiction; and I have wished to gratify this natural taste without indulging anything that is bad."

APOLGY. The term is now commonly understood as synonymous with an excuse for breach of an engagement, etc., but was originally used as the title of any work written in defense of certain doctrines, as in the *A. of Socrates*, ascribed to Plato and Xenophon; the *A. for the Christians*, by Tertullian, and in many other defenses of the Christians, written by Justin Martyr, Athenagoras, Tatian, Theophilus, Origen, Eusebius, Minucius Felix, Arnobius, Lactantius, Augustine, Orosius, and others. The attacks parried or retorted in these apologetical works are such as charges of atheism, want of philosophical knowledge, anti-social tenets, etc. Both the charges and the refutations brought forward serve to give us an insight into the character of the times when these

works were written. Thus, in the A. by Tertullian, it is curious to find a formal argument employed to refute the assertion that the spread of Christianity was the cause of "earthquakes" and other natural phenomena which had occurred in some parts of the Roman empire. After the 4th c., when the church was made dominant under the Roman emperors, apologetical writings were less called for; but Bartholus Edessenus and Raymundus Martinus wrote against the Jews and the Mohammedans. In the 15th c., when the revival of learning placed Christianity in apparent opposition to the Platonic philosophy, Marsilius Ficinus wrote in defense of revelation; and, some time after the reformation, the spread of freethinking and skepticism in England was opposed by a variety of apologetical works, chiefly maintaining the points that Christianity is a divine revelation, Christ a divine messenger, and his church a divine institution. The defense of Christianity on grounds of reason came now to be treated as a distinct branch of theology, under the name of *Apologetics*. Among the numerous apologetic works by Protestants, may be mentioned those by Grotius (*De Veritate*, etc.), Butler (*Analogy of Religion, Natural and Revealed*), Lardner (*Credibility of the Gospel History*), Leland, Addison, Soame Jenyns (*Internal Evidences of the Christian Religion*), Hugh Farmer, Bishop Watson (*A. for Christianity*), Paley (*Evidences of Christianity*, and *Horæ Paulinæ*), etc. Among Roman Catholic apologetic writers, the most eminent are Pascal, Houterville, Guenée, Bergier, Mayr, and Chateaubriand.

Recently, a great number of apologetic works by Neander, Tholuck, and others have appeared, in reply to Strauss's *Life of Jesus*, and the *Vie de Jésus* by Joseph Ernest Renan.

APOMORPHIA. See MORPHIA.

APONEUROSIS is an anatomical term for an expansion of strong fibrous tissue, of which there are many examples in the human body. For the sake of convenience, it is generally confined to expansions from the tendons of muscles, as the lumbar A. If a tendon is very broad and expanded, as that of the external oblique muscle of the abdomen, it is said to be aponeurotic. Some muscles, as those on the shoulder-blade, are partially covered with a tendinous expansion, to which some of their fibers are attached; this is termed the aponeurotic *origin* of the muscle; it gives the muscle a more extensive attachment, without adding materially to weight. Aponeuroses stretch in some localities as protections over large arteries; thus, in bleeding from the vein nearest the inside of the bend of the elbow, the only structure between it, the lancet, and the brachial artery, is an aponeurotic expansion from the biceps tendon into the muscles of the fore-arm.

APOPHTHEGM (Gr., an utterance), a term used to designate any truth or maxim sententiously expressed. The oracles of the heathen gods often took this form, as also the proverbs, memorable sayings, etc., of the sages of antiquity. In modern times, Lord Bacon has made a charming collection of apophthegms.

APOPLEXY is a term applied to an engorgement of blood, with or without extravasation, in or upon any organ, as the brain (*cerebral A.*), the spinal cord or lungs (*pulmonary A.*). As popularly used, the term denotes vaguely a condition arising from some disturbance within the head. A. occurs in *fits*, which may be sudden or come on by degrees. They are characterized by loss of sense and motion, speechlessness, and heavy sleep, with stertorous respiration and a slow pulse. The fit may last from a few hours to two or three days, and passes off, leaving generally more or less paralysis, and recurs at intervals of months or years. The *age* at which A. occurs most commonly is from 50 to 70, and is comparatively rare before and after these ages. Cerebral A. may arise from mere congestion of the blood-vessels of the brain, caused by impeded return of the venous blood, as from the military stock pressing on the jugular veins, keeping the head long in one position, or turning it quickly. Stout persons, with short necks, are more liable to this form of A., though lean persons are also frequently its victims. But, in addition to congestion, there may be an escape of the watery portion of the blood from the congested vessels, and, this collecting, produces *serous A.*; or, owing to a diseased condition of the arterial walls, the vessels may burst, and A. from cerebral hemorrhage be the result; the latter is the most common, and is usually preceded by some softening of the brain substance itself. If this bleeding be to any great extent, death results; if only a small quantity escapes, it coagulates, and forms a clot, which is absorbed in time. Persons with diseased heart and lungs, and pregnant females, are liable to apoplectic fits. The attack is generally preceded by vertigo, headache, partial or temporary loss of memory, and occasionally double vision. When these warnings occur, medical advice should be sought to correct the digestive functions; and, by relieving the oppressed brain, ward off the fit. When the latter occurs, the patient's head should be raised, cold applied, and in some cases blood should be withdrawn from the temporal artery or external jugular vein. As soon as possible, purgative medicines should be administered. For the results of A., see PARALYSIS. Tumors within the skull produce symptoms of A.

APOSTATE literally designates any one who changes his religion, whatever may be his motive; but, by custom, the word is always used in an injurious sense, as equivalent to renegade, or one who, in changing his creed, is actuated by unworthy motives. In early Christian times, the word was applied to those who abandoned their faith in order to escape from persecution; but it was also applied to such as rejected Christianity on

speculative grounds (the emperor Julian, for instance). After the 5th c., when heathenism was declining, many who had no sincere belief in Christianity, yet made profession of it, and were baptized: these also were styled apostates. The apostates in times of persecution were styled variously *Sacrificati*, *Thurificati*, etc., according to the modes in which they publicly made known their return to heathenism, by offering sacrifices or incense to the gods of Rome. The Roman Catholic church at one period imposed severe penalties on apostasy. The apostate was, of course, excommunicated; but sometimes, also, his property was confiscated, and he himself banished, or even put to death. It has often been of great moment to the fortunes of a nation that a prince has apostatized. The most renowned instance in modern history is that of Henry IV. of France. In 1833 there was published, at Erlangen, *A Gallery of Important Persons who, in the 16th, 17th, and 18th Centuries went over from the Protestant to the Roman Catholic Church*. The term **APOSTASY** is now employed commonly, and often abusively, as a reproach for great or sudden changes in political opinions.

A POSTERIO'RI. See **A PRIORI**.

APOSTLE (Gr. *apostolos*, sent forth, sent on a mission), any messenger whatever, but especially used to denote the twelve disciples whom Jesus sent forth to preach the gospel. Their names were Simon Peter, Andrew, John (the son of Zebedee), James (his brother), Philip, Bartholomew (called also Nathaniel), Thomas, Matthew (surnamed Levi), James (the son of Alphæus), Thaddeus, Simon, and Judas Iscariot. Subsequently Matthias was chosen in the room of Judas; and at a still later period the number of the apostles was further increased by the calling of Paul to the apostleship. The term is sometimes used in the New Testament in its more general signification. Barnabas is styled an A. (Acts xiv. 14). It is a point of controversy between the supporters and opponents of episcopacy, whether or not the term A., as indicating an office, is applied to any except the original twelve, Matthias and Paul; it being maintained, on the one hand, that the office is perpetuated in bishops; on the other, that it was temporary and belonged exclusively to those who were witnesses of the resurrection of Christ, and were employed by him to found the Christian church. The apostles were twice commissioned by their Master to go forth on their work of evangelization. First, during the third year of his public ministry. On this occasion their labors were to be restricted to the Jews, properly so called. Not even the Samaritans, though natives of Palestine, were to be the objects of their religious solicitude. They were earnestly to seek out the lost sheep of the house of Israel. The second time was shortly before the Lord's ascension, when their sphere of labor was indefinitely extended. "Go, and teach all nations, baptizing them in the name of the Father, and of the Son, and of the Holy Ghost." On the day of Pentecost, the apostles received miraculous gifts fitting them for their arduous work. And after evangelizing for some years in Palestine, they all departed, with the exception of St. James, into various quarters of the globe; but the region of their ministry seems to have principally comprised the civilized provinces and cities of the eastern part of the Roman empire—viz., Syria, Asia Minor, and Greece; though probably Peter, and after him Paul, visited Rome. There is no historical foundation for the tradition that the first apostles divided the then known world into twelve parts, each taking one of these for his special sphere of labor. This fgment was very likely originated by two circumstances: 1. That the disciples were commanded to go into all the world and preach the gospel; and 2. That the disciples in point of fact had little personal intercourse with each other. Their zeal for the propagation of Christianity left them no time to gratify their social inclinations. As a consequence, we have very imperfect accounts of their lives or manner of death.

The several apostles are usually represented in medieval pictures with special badges or attributes: St. Peter, with the keys; St. Paul, with a sword; St. Andrew, with a cross; St. James the less, with a fuller's pole; St. John, with a cup and a winged serpent flying out of it; St. Bartholomew, with a knife; St. Philip, with a long staff, whose upper end is formed into a cross; St. Thomas, with a lance; St. Matthew, with a hatchet; St. Matthias, with a battle-axe; St. James the greater, with a pilgrim's staff and a gourd-bottle; St. Simon, with a saw; and St. Jude, with a club.

APOSTLES' CREED. See **CREEDS**.

APOSTLES' ISLANDS, or **THE TWELVE APOSTLES**, in lake Superior, near the w. end; belonging to Wisconsin. There are more than twice the number of islands, having in all 125,000 acres. On Madeline Island is La Pointe. These islands were occupied by the French missions as early as 1658.

APOSTLES, TEACHING OF THE TWELVE. See **TEACHING OF THE TWELVE APOSTLES**.

APOSTOL'IC, or **APOSTOLICAL**, the general term applied to everything derived directly from, or bearing the character of the apostles. Either case constitutes apostolicity. The Roman Catholic Church declares itself the A. church; the papal chair the A. chair, on the ground of an unbroken series of Roman bishops, from the chief apostle, Peter. The church of England, in virtue of regular episcopal ordination from the pre-reformation church, claims to be A., as do the Protestant Episcopal churches in Scotland and the United States. Apostolic tradition (see **INFALLIBILITY**; **RULE OF FAITH**) claims to have been handed down from the apostles. In the same special sense, the name of A. council belongs to that conclave of the apostles at Jerusalem (Acts xv. 2), about 51 or 52 A.D., occa-

sioned by the disputes raised at Antioch by Judaizing Christians as to the admission of uncircumcised Gentiles into the church. Certain congregations or churches, also, which were the special scenes of the labors of the apostles, bore for centuries the title of A. churches, more especially those of Jerusalem, Antioch, Ephesus, Corinth, and Rome. But with the ever-increasing spiritual power of the Romish hierarchy, the name A. came to be more and more exclusively applied to Rome, and is retained by her, despite the energetic protests of the Protestant churches. Hence the term apostolic see, i.e., the see of Rome; apostolic blessing, the blessing of the pope as the successor of St. Peter; apostolic vicar, the cardinal who represents the pope in extraordinary sessions; apostolic chamber, a council intrusted with the care of the revenues of the see of Rome; apostolic months—Jan., March, May, July, Sept., Nov.—the months in which the pope, according to the Vienna Concordat of 1448, took possession of the vacant benefices in Germany, etc. A papal brief or letter is styled A. in the same sense.

APOSTOLIC BRETHREN, or **APOSTOLICI**, the name given in Italy, towards the end of the 13th c., to one of those sects which, animated by the spirit of an Arnold of Brescia, felt constrained to oppose the worldly tendencies of the church. Its founder was Gerhard Segarelli, a weaver in Parma. Rejected, from some cause or other, by the Franciscan order, his long-continued and enthusiastic meditations led him to the profound conviction that it was above all things necessary to return to the simple forms of apostolic life. Accordingly, he went about (1260) in the garb of the apostles, as a preacher of repentance, and by his practical discourses gathered many adherents into a kind of free society, bound by no oaths. At first he managed to avoid any direct collision with the dogmas of the church; but after twenty years of undisturbed activity and growing influence, Segarelli was arrested by the bishop of Parma; and in 1286, upon the occasion of his release, pope Honorius IV. renewed a decree of pope Gregory X. against all religious communities not directly sanctioned by the papal chair. In 1290, Nicholas IV. setting himself to expose the A. B., they, on their side, began avowedly to denounce the papacy, and its corrupt and worldly church, as the Babylon of the Apocalypse. In 1300, many, both men and women, and among them Segarelli, as having, after abjuration, relapsed into heresy, perished at the stake. But his cause survived him. Dolcino, a more energetic and cultivated man, brought up as a priest, who had previously taken an active part in the Tyrol against the corruptions of the church, now headed the orphan sect in Italy. He taught the duty of a complete renunciation of all worldly ties, of property and settled abode, etc. Having retreated into Dalmatia, he announced from thence the dawning of the new era, and in 1304 reappeared in upper Italy, with thousands of adherents, as the enemy of the papacy—at that time humbled and impoverished by France. In 1305, a crusade was preached against him. He fortified the mountain Zebello, in the diocese of Vercelli, but was, after a gallant defense, compelled by famine to submit. After horrible tortures, which he bore with the utmost fortitude, he was burned. In Lombardy and the south of France, brethren lingered till 1368.

APOSTOLIC CATHOLICS. See IRVINGITES.

APOSTOLIC FATHERS, the name given to the immediate disciples and fellow-laborers of the apostles, and, in a more restricted sense, to those among them who have left writings behind them. The A. F., specially so called, are Barnabas, Clement of Rome, Ignatius of Antioch, and Polycarp of Smyrna. It is uncertain whether Papias of Hierapolis, and the author of the *Shepherd*, were really disciples of the apostles. The writings of the A. F., as to their form and subject, may be looked upon as a continuation of the apostolic epistles, though far inferior to them in spirit. Their main purpose is to exhort to faith and holiness before Christ's coming again.—Editions of the A. F. were published by Cotelierus (Par., 1672), Jacobson (Oxford, 1838), Hefele (1839), and Dressel (1857); another by Zahn, Gebhardt, and others began to appear in 1875. There are several English translations, including one in Dr. Donaldson's *Ante-Nicene Library*, vol. i. (1867).

APOSTOLIC MAJESTY, a title held by the kings of Hungary, was conferred by pope Sylvester II., in 1000 A.D., upon Duke Stephen of Hungary, who had not only much encouraged the progress of Christianity in Hungary, but actually preached himself, in imitation of the apostles. In 1758, the title was renewed by Pope Clement XIII., in favor of Maria Theresa as queen of Hungary, and continues to be used by the emperor of Austria as king of Hungary.

APOSTOLIC CANONS and **CONSTITUTIONS**, both ascribed by tradition to Clemens Romanus, are notes of ecclesiastical customs held to be apostolical, written in the form of apostolic precepts. The *Constitutiones Apostolicæ*, consisting of eight books, were probably composed in Syria, and contain, in the first six books, a comprehensive rule for the whole of the Christian life. These were probably written about the end of the 3d c.; while the seventh book, which is essentially an abridgment of them, may have belonged to the beginning of the 4th century. The eighth book was put together in the middle of the 4th c., for the use of the priests, and only relates to the sacred offices. Interpolations, however, were afterwards introduced. The *Canones Apostolici*, which were also recognized by the church, were composed at a later period. The first fifty, compiled in the

middle of the 5th c., and translated from Greek into Latin by Dionysius the younger, were acknowledged by the Latin church alone. The Greek church, on the other hand, accepted the 35 canons put forth in the beginning of the 6th c.; and this became a point of discord between the churches. Both collections were probably looked upon at first as apostolic traditions merely. Later, it came to be believed that they were written down by the apostles themselves.

APOSTOLIC PARTY, the name given to a party who acted a conspicuous part in the modern history of Spain. They were composed of fanatical Catholics, who were also absolutists so far as the king consented to be their instrument. They formed themselves (soon after the revolution of 1819) into an A. P., whose leaders were fugitive priests, and whose troops were smugglers and robbers. After taking an active part in all the subsequent agitations, they finally merged (1830) in the Carlist party.

APOSTOLIC SUCCESSION. The unbroken succession of the ministry of the Church, in due form, from the apostles, and thus from Christ Himself. The argument in behalf of this doctrine is as follows: "It is noteworthy that this doctrine has received full and explicit acceptance throughout Christendom from the earliest times. While many other essential articles of Christian belief have been developed slowly, or have attained their place only by much discussion and conflict, this appears in complete and distinct expression before the end of the first century. The Canon of the New Testament was a matter which required much time before it was finally settled what books it should exclude and what books it should contain. The doctrine of the Trinity was in wide and bitter debate in the fourth century. Fundamental questions concerning the Incarnation were considered in the sixth Œcumenical Council, in the year 680. But the Apostolic Succession was believed and understood by the Church at once, as though instinctively. And it was clearly set forth while some of the apostles were still living, and before all the books of the New Testament were written; in the First Epistle of Clement to the Corinthians, as follows: 'The Lord has enjoined offerings to be presented and service to be performed to Him, and that not thoughtlessly or irregularly, but at the appointed times and hours. Where and by whom He desires these things to be done He Himself has fixed by His own supreme will. The apostles have preached the Gospel to us from the Lord Jesus Christ; Jesus Christ from God. Christ therefore was sent forth by God, and the apostles by Christ. Both these appointments, then, were made in an orderly way, according to the will of God. Having therefore received their orders, they went forth proclaiming that the kingdom of God was at hand. And thus preaching through countries and cities, they appointed the first-fruits of their labors, having first proved them by the Spirit, to be bishops and deacons of those who should afterwards believe. They appointed those ministers, and they afterwards gave instructions, that when these should fall asleep other approved men should succeed them in their ministry.' In these words, it appears (1) that not all Christians are stewards of the mysteries of God, but that (2) there is a ministerial order, which (3) originates in the supreme will of God, (4) by the mission of Christ, (5) continued in the apostles, (6) by them entrusted to others, and (7) with instructions which should carry on to other generations the same ministry. The Epistles of Ignatius, another of the 'Apostolic Fathers,' 107 A.D., are to the same effect. It must suffice simply to refer the reader to them. No quotation, consistent with the necessary limits of this article, would do justice to the extent and conclusiveness of their testimony. A few words, however, may be given here from Irenæus, 185 A.D., and from Tertullian, 196 A.D. Irenæus says: 'After our Lord rose from the dead, the apostles were invested with power from on high, and departed to the ends of the earth preaching the glad tidings. It is within the power of all who may wish to see the truth, to contemplate clearly the tradition of the apostles; and we are in a position to reckon up those who were by the apostles instituted bishops in the Churches, and the succession of these men to our own times. In this order and by this succession, the ecclesiastical tradition from the apostles and the preaching of the truth have come down to us. And this is most abundant proof that there is one and the same vivifying faith, which has been preserved in the Church from the apostles until now and handed down in truth.' And Tertullian: 'Our Lord did, whilst He lived on earth, Himself declare what the Father's will was which He was administering, what the duty of man was which He was prescribing, to the apostles whom He destined to be the teachers of the nations. They then founded Churches in every city, from which all the other Churches, one after another, derived the tradition of the faith and the seeds of doctrine, and are every day deriving them, that they may become Churches. Indeed, it is on this account only that they will be able to deem themselves apostolic, as being the offspring of apostolic Churches. Since the Lord Jesus Christ sent the apostles to preach, our rule is that no others ought to be received as preachers than those whom Christ appointed. Or, let them prove themselves to be new apostles! Let them maintain that Christ has come down a second time, taught in person a second time, has been twice crucified, twice dead, twice raised! But, if there be any which are bold enough to plant themselves in the midst of the apostolic age, let them produce the original records of their Churches; let them unfold the roll of their bishops, running down in due succession from the beginning in such a manner that that first bishop of theirs shall be able to show for his ordainer and predecessor some one of the apostles or of apostolic men, a man, moreover, who continued steadfast with the apostles. For this is the manner in which the apostolic Churches transmit their registers; as the Church of Smyrna, which records that Polycarp was placed therein by John."

as also the Church of Rome, which makes Clement to have been ordained in like manner by Peter. In exactly the same way, the other Churches likewise exhibit their several worthies, whom, as having been appointed to their episcopal places by apostles, they regard as transmitters of the apostolic seed.'

The Apostolic Succession has continued in the Church, both in doctrine and practice, from the first century until now; during 1500 years without an exception; and, as to the exceptions of the last 300 years, they are the consequence of historic accident, not of deliberate consideration and choice beforehand. That there should have been this universal maintenance of the Apostolic Succession is but a natural result from the character itself of the Christian religion; for that religion is not a mere philosophy or ideal. On the contrary, it takes its place in the world as a reality, a fact. The incarnation is real—'God was manifest in the flesh.' The incarnate Son of God lived on earth, in actual verity, a human life. He promised, on a notable occasion, that He would build His Church; He described it in His parables. And He did build it. Throughout the New Testament, after His ascension, it is found to be in existence, a visible society, a fact and not a metaphor, having its Sacraments, worship, creed, and government. The Lord organized His religion, left it on the earth in the form of an institution. To this organization a ministry was necessary, for the administration of its sacraments, its discipline, its worship and doctrine. A ministry was one of the constituent parts of the organization. And this ministry the Lord ordained when He said to the apostles, 'As my Father hath sent Me, even so send I you;' 'Receive ye the Holy Ghost;' and He made it not for a day but for all time by the words, 'Lo, I am with you alway, even unto the end of the world.' It appears in the New Testament that the apostles exercised the ministry thus committed unto them. They fulfilled its duties. No other ministerial line appears in the New Testament but theirs. There is no instance of any ordination but by apostles. And they provided for the continuance of the same ministry after their departure out of this world. Of this the Epistles to Timothy and Titus are sufficient evidence. Both had been advanced to apostolic rank, and had by St. Paul been left in charge, the one of the Church at Ephesus, the other of the Church in Crete; and St. Paul's instructions to them show very fully what their duties were—duties which imply their supervision of elders, deacons, laymen, (1) in respect of conduct; (2) in respect of the doctrine which should be taught, e.g., these words to Timothy: 'Hold fast the form of sound words which thou hast heard of me;' 'Charge those who preach that they teach no other doctrine;' (3) in respect of the discipline of the clergy, e.g., 'Against an elder receive not an accusation but before two or three witnesses; them that sin rebuke before all, that others also may fear; observe these things without preferring one before another, doing nothing by partiality,' and (4) in respect of ordination, what qualifications the persons to be ordained must possess, for ascertaining which Timothy is responsible, as also for the ordination itself: 'Lay hands suddenly on no man,' i.e., ordain no one without due deliberation—so fulfilling the injunction, 'The things which thou hast heard of me among many witnesses, the same commit thou to faithful men who shall be able to teach others also.'

The Epistle to Titus is of the same tenor, written for the same ends, and containing similar instructions. In brief, the Christian religion is supernatural—a supernatural revelation of truth, supernatural gifts of spiritual life; which truth and life are entrusted to and conveyed through a corporate body, the kingdom of heaven on earth, a visible institution yet divine in its creation and organization; a body, moreover, acting by an order of men set apart, in obedience to the divine will, to be the ministrants of its spiritual gifts. These are principles of the Christian religion, as distinct and clear as they are fundamental. And from these premises it is obvious the Apostolic Succession is a logical and necessary conclusion, viz., that the ministry which Christ began has rightly and duly descended to this present time, and will continue until the end."

APOTACTICI, a sect of heretics who, wishing to restore the purity of the primitive church, renounced all their possessions and adopted an ascetic mode of life. Later they adopted the principles of the encratites (q.v.), who forbade marriage as identical with unchastity. See **TATIAN**.

APOTHECARY. See **CHEMISTS AND DRUGGISTS**.

APOTHEOSIS, deification, or the raising of a mortal to the rank of a god (Gr., *theos*). From the polytheistic point of view there is nothing monstrous in this idea; on the contrary, it is quite natural, and a necessary part of the system. Among heathens generally, and especially among the Romans, every departed spirit became a deity (see **LARES**); "and as it was common for children to worship (privately) the manes of their fathers, so was it natural for divine honors to be publicly paid to a deceased emperor, who was regarded as the parent of his country." (See *Smith's Dictionary of Greek and Roman Antiquities*.) At the *Consecratio*, as it was called, of a Roman emperor, the body was burned on a funeral pile, and as the fire ascended, an eagle was let loose to mount into the sky, carrying, as was believed, the soul of the emperor from earth to heaven. Many medals are found with the word *consecratio* surrounding an altar, with fire on it.

APPALACHEE BAY, a portion of the gulf of Mexico near the n. part of Florida, extending about 50 m. inland. It receives the waters of St. Mark's river.

APPALACHEES, a tribe of Indians, of the Choctaw family, in Florida, on A. bay. They were friendly with the Spaniards until white oppression provoked a revolt in 1687, when they were quickly subdued. Soon afterwards, the English and their Indian

allies fell upon the A. and killed or carried off many of them. In 1704 St. Mark's was taken and the missionaries put to death. The A. disappeared as a tribe of any importance after 1722.

APPALACHIAN CLUB, an organization formed in Boston about 1876, for the thorough exploration of mountains, particularly those of the Atlantic coast, for the advancement of physical geography, geology, hydrography, zoology, and botany, thus resembling the Alpine clubs of other countries. Its membership, which is not limited to residents of New England, comprises a large and enthusiastic body of professional and amateur students, who aid the scientist by their discoveries and observations, and add to the safety and pleasure of the tourist by cutting paths to mountain summits, marking roads, preventing the disfigurement of natural scenery, etc. The organ of the club is a bi-monthly magazine, *Appalachia*, pub., Boston. See **ALPINE CLUB**.

APPALACHIANS, the general appellation of the great mountain-system—called also the Alleghanies—which stretches from the interior of Maine to the borders of Alabama, its distance from the sea gradually ranging between about 100 m. in the n. and about 300 in the s. Speaking generally, this chain may be regarded as the parent of the Atlantic rivers of the United States on the one side, and on the other of the southern tributaries of the St. Lawrence, and of the eastern feeders of the Mississippi: it is not, however, the actual water-shed during its entire length, for it is crossed by the Connecticut, the Hudson, and the Delaware, just as the Himalayas are pierced by the Ganges, and the Andes by the Amazon. The chain, in fact, consists of several ranges generally parallel to each other, which, along with the intermediate valleys that occupy two thirds of the breadth, form a belt 100 m. wide—its multifiform character, however, developing itself only to the w. and s. of the Hudson. To take the chief ridges by name, and to begin from the n.: the white hills of New Hampshire present some of the loftiest elevations, Moosehillock and Washington being respectively 4636 and 6285.4 ft. above the sea. Next in order, the Green mountains, which, true to the name, almost cover Vermont, attain, in Mt. Mansfield, a height of 4430 ft.; then come the Highlands, on the e. of the Hudson, so striking an object to the voyagers on its waters; immediately beyond that river, again, we find the Catskill mountains, which, though of inconsiderable length, contain two eminences—Round Top and High Peak—respectively of 3804 and 3718 ft.; while, on a terrace of another member of the group Mountain House, a favorite refuge from the heats of summer, is perched 2231 ft. above the level of the Hudson. Proceeding onwards, the Kittatinnies extend from the n. of New Jersey as far as Virginia; while nearer to the sea, the Blue Ridge, stretching from about the same parallel down to North Carolina, is crowned, within the limits of Virginia, by the peaks of Otter, 3993 ft. high. In North Carolina are the Black mountains, with the highest summit of the system, Clingman's peak, 6940 ft. in height. Lastly, there lie, more to the westward, the Alleghanies proper in Pennsylvania and Virginia, and the Cumberland mountains on the e. border of Kentucky and Tennessee.

Of all these elevations not one at all approaches the limit of perpetual snow. Yet France, while struggling with England in North America, regarded the A. as a wall that was physically to exclude her rival from the basins of the St. Lawrence and the Mississippi. Anglo-Saxon energy, however, has virtually leveled the supposed barrier from end to end. Through Maine, New Hampshire, and Vermont runs a railway from Portland to Canada; by canal or by railway, or even by both abreast, New York has reached the waters of the St. Lawrence on at least four principal points between Montreal in the e. and Buffalo in the w.; Pennsylvania has carried to Pittsburgh a railway of 248 m. from Harrisburgh, and a canal of 312 m. from Columbia; while, with the necessary exception of little Delaware alone, the remaining states along the coast have each its iron-way through the A.

The chain abounds in coal and iron, those gifts of nature to industrious man, which in all ages have done so much for civilization, and which, in our own age, have, with the aid of steam, more than doubled all that they had done before; and it is a curious instance of the adaptation of the two worlds to each other, that, while the Spaniard met, in the south, the gigantic counterparts of the central plateau of his own romantic land, the Englishman, in the north, stumbled, as it were, on those same elements of almost creative energy which, within two centuries were to be so instrumental in placing the daughter next to the mother among the nations of the earth. As an evidence of the actual value of the coal and iron of the A., Pennsylvania—where, hitherto, they have been chiefly found—has since 1840 made more rapid strides in growth of population than any other state in the union, till between 1860 and 1870, when Illinois increased somewhat more rapidly. Nor are iron and coal the only valuable products of the A. To say nothing of the valleys—many of them as fertile as they are lovely—which separate the parallel ranges from each other, the mountains themselves yield limestone, marble, slate, building-stone, copper, zinc, chrome, etc.

Geology.—During the azoic and palæozoic periods of the earth's geological history, the district now occupied by the A. was a level plain. These mountains date their origin from a period subsequent to the carboniferous epoch. The coal measures are the newest upturned beds associated with the Appalachian range; and as the stratified rocks, with few exceptions, are laid down horizontally, these strata must owe their inclined position to the dislocating agency which elevated the mountains; they, consequently,

supply a date anterior to its activity. At the base of the A., on their eastern side, there are a series of red sandstone beds, unconformable to the upturned strata, and occupying the valleys in their original horizontality, thus evidently unaffected by the disrupting agency which must have been active prior to their deposition. These beds have been referred by geologists to different ages. That they are old red sandstone, as conjectured by Maclure and others, is now universally denied. Hitchcock's supposition that they were permian, is also considered as referring them to too remote a geological age. W. B. Rogers considered them first as members of the triassic period; but has since, from evidence adduced from the contained organic remains, shown reason for relating them to the beginning of the jurassic period. We thus obtain two grand limiting dates—the carboniferous and jurassic periods—within which the A. must have been formed. There are grounds for being even more specific, and referring the period of the dislocating agency to that immediately subsequent to the carboniferous, represented in the stratified rocks of other districts by the permian series; for the older upturned rock had not only been ruptured and plicated, but also denuded into the various shapes they now present, before the horizontal rocks were deposited.

The late Prof. H. D. Rogers, after years of persevering and devoted study, enunciated a theory of mountain formation based on his examination of the A., which not only explains their structure, but admits of a more or less complete application to the mountain-systems of the world. The many proposed theories of mountain elevation are based upon assumptions which, unfortunately, are not true; but that is an unimportant matter to the majority of our speculating geologists, and one never seen by the inventors of the theories, who allow themselves to be led captive by a poetic imagination, instead of building their inductions on field observations. Thus, to suppose that mountains are elevated by a wedge-like intrusion of melted matter, is to give to a fluid functions incompatible with its dynamic properties. So also the supposition that the igneous rocks were intruded as solid wedges, separating and lifting the crust, is opposed to the fact that no apparent abrasion, but generally the closest adhesion, exists at the line of contact of the igneous and stratified rocks. Equally fatal objections can be adduced against the other theories. Prof. Rogers observing that the A. were formed of a series of enormous waves, and comparing this appearance with other elevated districts, especially in Belgium and Britain, enunciated a theory of their structure, of which the following is a condensed view:

Disturbed strata have a wave-like arrangement, their dip being in curved, and never in straight planes; and in extensive areas the varying angles of dip exhibit one or more wide regular curves. These undulations are in the form of long parallel waves, their parallelism being in the line of the general trend of the part of the mountain system to which they belong. When different grades of magnitude, as regards length, height, and amplitude, occur, the waves of the same grade are parallel, while the different grades are not necessarily so. The waves assume three different forms, which are characterized as—*symmetrical flexures*, equally steep on the two slopes; *normal flexures*, having an excess of incurvation on the one side compared with the other; and *folded flexures*, or those with a doubling under of their more incurved slopes, and among which the steepest slopes are generally directed to the same quarters. These three forms, representing different gradations in the flexure, are regular in their succession in disturbed regions, the order being the same as in the diagram—that is, when we start from the most disturbed side, we go from the folded waves to the normal ones, and from these to the symmetrical; and in the same order, the waves, as they recede from the folded side, become progressively wider apart and flatter. Resting on these facts, Prof. Rogers advanced his view of the structure of elevated regions in the following words: "The wave-like structure of undulated belts of the earth's crust, is attributed to an actual pulsation in the fluid matter beneath the crust, propagated in the manner of great waves of translation from enormous ruptures occasioned by the tension of elastic matter. The forms of the waves, the close plication of the strata, and the permanent tracing of the flexures, are ascribed to the combination of an undulating and a tangential movement, accompanied by an injection of igneous veins and dikes into the rents occasioned by the bendings. This oscillation of the crust, producing an actual floating forward of the rocky part, has been, it is conceived, of the nature of that pulsation which attends all great earthquakes at the present day."

This theory having originated as an explanation of the phenomena of the A., is easy of application to these mountains. They are composed of a series of parallel waves, having a general direction similar to the coast-line of the Atlantic ocean. The line of maximum disturbance is on their eastern limits; consequently, the folded flexures, with the inversion of their steep sides, are chiefly confined to the great Appalachian valley, and the Atlantic slopes s. of it. The flexures of this type impart a prevailing s.e. dip to the whole outcrop; their number, and the excessive difficulty of detecting and continuously tracing them, frustrates every attempt at mapping them individually. The flexures of the second type, which curve more rapidly on the one side than on the other, prevail wherever the forces that disturbed the crust were neither excessively intense nor very feeble. It is the characteristic form everywhere between the great Appalachian valley and the Alleghany mountains. It distinguishes not only those larger waves which separate the coal-containing strata e. of the Susquehanna into special basins—but the

minor undulations which throw the coal measures of these basins into groups of lesser saddles and troughs. Undulations of the first or symmetrical type occur beyond the Alleghany mountains, where two groups of them may be distinguished: the one subdividing the bituminous coal-field, with its five very broad waves, into six successive basins; the other, composed of four equidistant and very straight undulations, traversing parts of Cambria, Indiana, Somerset, and Fayette counties.

The strata thus elevated, and forming the A., belong entirely to the oldest or palæozoic division of the fossiliferous rocks. Metamorphic rocks, consisting of felspathic, hornblende, and micaceous gneiss, and mica-slate, exist on the eastern base of these mountains, but have not been noticed as forming part of the plicated strata of the A. Extensive formations of talcose and micaceous slates, indurated clay-slates, and chloritic and steatitic slates, exist in the more disturbed districts. These are highly metamorphosed members of the older fossiliferous, and must not be confounded with, though they so much resemble, the azoic metamorphic rocks.

The palæozoic rocks constitute a vast succession of fossiliferous strata, commencing with the lowest deposits resting on the metamorphic rocks, and terminating with the highest of the coal strata. Their aggregate thickness, as measured in Pennsylvania, amounts to 35,000 ft. While exhibiting a remarkable variety of mineral character, they may be classed under the three great divisions of sedimentary rocks—viz., sandstones, slates, and limestones. Intercalated with them, as subordinate layers, there occur deposits of coal, chert, and iron ore. They are all more or less fossiliferous.

Coal Measures.—The character of the rocks of the Appalachian district of North America indicates that during the carboniferous epoch an immense continent existed on the present site of the Atlantic, which supplied materials for the sandstone and slate. It seems to have had an extensive shallow marshy shore, of such a character as to be able to support the vegetation, which has become, in the course of ages, converted into coal. The coal-fields to the far w. of the A., in Michigan, Indiana, Illinois, and Missouri, have been connected with the Appalachian coal formation, which includes all the detached basins, both anthracitic and semi-bituminous, of the mountain chain of Pennsylvania, Maryland, and Virginia, and also the vast bituminous trough lying to the n.w. in Pennsylvania, Ohio, Virginia, Kentucky, Tennessee, and Alabama.

On the eastern slope of the A., the coal, from its proximity to the region of greatest disturbance, has lost nearly all its volatile constituents, and is converted into hard shining anthracite (q. v.). In the troughs to the westward of the great Appalachian valley, where the forces that disturbed the crust were not so intense, the coal has not parted with such a large proportion of volatile matter, but still is so much altered as to be characterized as semi-anthracite. Both the anthracite and semi-anthracite are extensively mined for economical purposes, but their extent as well as their value is of little importance compared with the enormous Appalachian bituminous coal-field. From northern Pennsylvania to middle Alabama, its length is about 875 m., and its greatest breadth between southern Pennsylvania and northern Ohio is about 180 m.; it covers an area of about 56,000 sq. m., and is almost the largest expanse of coal measures in the world. A single coal-seam in this field has been traced over an extent of country 225 m. long by 100 broad, showing a superficial area of 14,000 sq. miles. The actual depth of workable seams in the deepest part of this basin is estimated at 40 ft.; but when the amount of denudation of the upper measures over large districts is taken into account, the average depth of the entire field cannot be more than 25 ft. Taking this as the thickness, the amount of coal in this great coal-field would be 1,387,500,000,000 tons. When this is compared with the estimated quantity of coal in the British coal-fields, viz., 190,000,000,000 tons, some conception may be formed of the enormous extent of coal existing in this district of North America.

Metals.—Extensive beds of magnetic, hematitic, and fossiliferous iron ores occur in many of the formations of the A., from the lowest metamorphic gneiss to the highest coal-measures. Iron ore is extensively wrought in Pennsylvania and Ohio, large quantities of the anthracite being used in the smelting furnaces. Veins of lead occur in the metamorphic rocks, rarely stretching up into the red slate. In the palæozoic beds, veins of copper and nickel occur in sufficient quantity to be wrought.

APPALACHICOLA, a river of the United States, rising in Georgia, and flowing through Florida into the gulf of Mexico, or rather into a bay that bears its own name. Reckoning from its remotest sources, the head-waters of the Chatahooche, the A. is about 400 m. long, being navigable for boats throughout nearly its entire course. It is, however, only at the junction of the Chatahooche with the Flint that the name of A. is applied to the stream; and up to this point, a stretch of about 70 m., there is a sufficient depth of water for steam navigation; while the tides also ascend for about two thirds of the distance.—A. is also a seaport at the mouth of the stream above mentioned. Here is shipped the produce of the river basin, consisting chiefly of large quantities of cotton.

AP PANOOSE, a co. in s. Iowa on the Missouri border; 500 sq. m.; pop. '90, 18,961. It has a fertile surface of rolling prairie, with timber along the watercourses, and large beds of coal. The products are chiefly agricultural. Co. seat, Centreville.

APPARATUS, in the sciences, a collection of tools or instruments for experimenting or working. In physiology, a group or collection of organs associated in a single

function; as, the heart, veins, and arteries are the circulatory A.; the limbs are the A. of locomotion, etc.

APPARENT. This term is used to express a number of important distinctions, especially in astronomy. The *A. magnitude* of a heavenly body is the angle formed by two lines drawn from the ends of its diameter to the spectator's eye: this obviously depends upon the distance of the body, as well as upon its real magnitude. A planet seen from the surface of the earth seems lower than if seen from the center of the earth—the former is its *A. altitude*, the latter its real. *A. noon* is when the sun is on the meridian; true or mean noon is the time when the sun would be on the meridian if his motion in the heavens were uniform and parallel to the equator. See **EQUATION OF TIME**. The daily and annual motions of the sun in the heavens are both *A. motions*, caused by two real motions of the earth.

APPARITIONS. The belief that the spirits of the departed are occasionally presented to the sight of the living, has existed in all ages and countries, and usually declines only when a people have advanced considerably in the knowledge of physical conditions and laws. Not that A. then cease to be reported—for this is far from being the case—but that the more intelligent part of the community are then usually able to explain away the alleged occurrence in some way satisfactory to themselves, not involving the admission of a possible projection of a spirit upon the living sense.

Nothing is more certain than that there are conditions of the body when spectral appearances, such as occur to us in uneasy dreams, become sensible to the waking vision. One of these conditions is that of the patient under the disease of *delirium tremens*, who not only hears ideal enemies plotting against his life in adjacent rooms or behind hedges, but thinks he sees them preparing to do him mischief, and has been known to jump overboard of a vessel into the sea, in order to escape the apprehended danger. In such excitements it is, though arising from different causes, that an intending murderer thinks he hears the prince of fallen angels tempting him on to crime, or sees before him a "dagger of the mind" wherewith to end the life of his victim. There are also instances of spectral illusions traceable to a simply disordered state of the digestive organs. M. Nicolai, an eminent bookseller in Berlin, fell, in the early part of the year 1791, into a depression of spirits, and in that condition neglected a course of periodical bleeding which he had been accustomed to observe. The consequence was his becoming liable for some months to seeing trains of phantasmata or spectral figures, which moved and acted before him, nay, even spoke to, and addressed him. He was fortunately able, not merely to coolly observe the phenomena, but to describe them in an ample paper which he presented to the philosophical society of Berlin. This case may be said to have formed the basis of a theory of A., advanced by Dr. Ferrier, Dr. Hibbert, and others, amounting merely to this, that they are all to be accounted for by peculiar conditions of the organism of the individual sensible of them.

There is certainly a large class of cases which fall readily under this explanation; but, if we are to accept the whole that have been, on more or less good authority, reported, it must be admitted that a theory of a more comprehensive nature is still required in order to satisfy the duly cautious inquirer.

Let us take, for instance, an apparition story which Dr. Hibbert owns to be one of the best authenticated on record. It was thus written down in 1662 by the bishop of Gloucester, from the recital of the young lady's father: "Sir Charles Lee, by his first lady, had only one daughter, of which she died in childbirth; and when she was dead, her sister, the Lady Everard, desired to have the education of the child; and she was by her very well educated, till she was marriageable, and a match was concluded for her with Sir William Perkins, but was then prevented in an extraordinary manner. Upon a Thursday night, she thinking she saw a light in her chamber after she was in bed, knocked for her maid, who presently came to her, and she asked why she left a candle burning in her chamber. The maid said she left none, and there was none but what she had brought with her at that time. Then she said it was the fire; but that, her maid told her, was quite out; and she said she believed it was only a dream; whereupon she said it might be so, and composed herself again to sleep. But about two of the clock she was awakened again, and saw the apparition of a little woman between her curtain and her pillow, who told her she was her mother, that she was happy, and that by twelve of the clock that day she should be with her. Whereupon she knocked again for her maid, called for her clothes, and when she was dressed, went into her closet, and came not out again till nine, and then brought out with her a letter, sealed, to her father: brought it to her aunt, the lady Everard, told her what had happened, and desired that as soon as she was dead, it might be sent to him. The lady thought she was suddenly fallen mad, and thereupon sent suddenly away to Chelmsford for a physician and surgeon, who both came immediately; but the physician could discern no indication of what the lady imagined, or of any indisposition of her body; notwithstanding the lady would needs have her let blood, which was done accordingly. And when the young woman had patiently let them do what they would with her, she desired that the chaplain might be called to read prayers; and when prayers were ended, she took her guitar and psalm-book, and sat down upon a chair without arms, and played and sung so melodiously and admirably, that her music-master, who was then there, admired at it. And near the stroke of twelve, she rose and sate herself down in a great chair with arms, and pres-

ently fetching a strong breathing or two, immediately expired, and was so suddenly cold, as was much wondered at by the physician and surgeon. She died at Waltham in Essex, three miles from Chelmsford, and the letter was sent to Sir Charles at his house in Warwickshire, but he was so afflicted with the death of his daughter, that he came not till she was buried; but when he came, he caused her to be taken up, and to be buried with her mother at Edmonton, as she desired in her letter."

Dr. Hibbert, in treating of this case, concludes that the young lady was consumptive and about to die, and in this diseased frame of body became the subject of an illusion; but these are assumptions directly contrary to what the record bears, and there is, after all, the singular circumstance to be accounted for, that the young lady's death occurred exactly at the time predicted. To a similar purport is the case of the wife of Dr. Donne, related by Izaak Walton. Donne left his wife pregnant in London, and went with Sir Robert Drury to Paris. Two days after arriving there, he stated to Drury that he had had a vision of his wife walking through his room, with her hair hanging over her shoulders, and a dead child in her arms. So impressed were they by the incident that they immediately sent a messenger to London to inquire regarding Mrs. Donne's health. The intelligence brought by the man was, that she had been brought to bed of a dead child at the hour her husband thought he had seen her in Paris. In this case, too, if the requisite disordered state of Dr. Donne were granted, the coincidence of the distant event in its particulars, and in point of time, would remain unaccounted for by Dr. Hibbert's theory.

That there is an abundance of such cases reported, will not be disputed. In what direction speculation regarding them is to move, if the insufficiency of Dr. Hibbert's theory be acknowledged, will probably depend on the general tendency of the movements of science. If psychological study were more in repute, and the phenomena of dreaming in particular were diligently examined, there might be a hope of a satisfactory theory of what are called A. ere the world was many years older.

APPARITOR, a name for officers and public servants who attended magistrates or judges, such as scribes, lictors, and heralds. In England A. is applied to the beadle of a university, who carries the mace, and to the messenger who serves the process of a spiritual court.

APPEAL, in the civil procedure of courts of justice, signifies the removal of a suit from one court or judge to another and higher court or judge, in order that the latter may examine the validity of the former's judgment, either affirming or reversing, altering or varying the judgment. A., however, is not a technical term in the procedure of the English and Irish common-law courts. For many years past, a reconstitution of the English courts of law and equity has been impending, and has now in the main been carried out. Meanwhile it seems convenient to abide by the names and divisions hitherto in use in appeals; the subject can readily be traced under either system of nomenclature.

1. In the courts of *equity* (or of chancery), where there is an A. from the judgment of the master of the rolls, and from the vice-chancellors, or rather, as those judges form part of the chancery division of the high court of justice, the A. lies from such division to the new court of appeal generally; the jurisdiction of the house of lords being retained in 1875, so far as regards all appeals from the various courts and divisions of the high court of justice. The construction of the latter court, as also of the new court of appeal, is given under the article Common Law, Courts of (q.v.).

2. In the courts of *bankruptcy*, the judgments of which may be appealed from now directly to the chancery division, and ultimately to the house of lords, under certain restrictions.

3. In the *probate division*, there is an A. to the court of A., with leave of the court. In the procedure of this tribunal there is also an A. from the county court, where such court has jurisdiction, to the probate division itself, whose judgment is final, unless with leave of the court.

4. In the court of *divorce* and *matrimonial causes*, the decision of the judge ordinary, sitting alone, may be appealed to the court of A. for the present. And in the case of a decree dissolving a marriage, there may be an A. to the court of A.

5. In the admiralty courts there is an A. to the court of A., as the jurisdiction in admiralty causes is merged in the division of the high court of justice called the probate, divorce, and admiralty division, and which stands on the same footing towards the supreme court as the other divisions.

6. There is also an A. to the privy-council (to be merged in the court of A.), from the courts of India and from the colonial courts generally; and such A. includes the sentences, not only of courts of primary jurisdiction, but also of courts of A. in the colonies, and all the dependencies of the crown;* in applications to prolong the term of

* As to colonial causes, we are informed by Blackstone that the jurisdiction of the privy-council was "both original and appellate. Whenever a question arises between two provinces out of the realm, as concerning the extent of their charters and the like, the king in his council exercises original jurisdiction therein, upon the principles of feudal sovereignty. And so likewise, when any person claims an island or a province, in the nature of a feudal principality, by grant from the king or his ancestors, the determination of that right belongs to the king (or queen) in council, as was the case of the earl of Derby, with regard to the isle of Man, in the reign of queen Elizabeth, and the earl of Cardigan and others, as representatives of the duke of Montague, with relation to the island of St. Vincent, in 1764."

patents for new inventions; and in making orders in certain cases relative to copyright, pursuant to the provisions of the copyright acts.

Practically, however, as we are told by Mr. Stephen in his commentaries, all judicial authority of the privy-council was long exercised by a *committee* of privy-councillors, called the judicial committee of the privy-council; who heard the allegations and proofs, and made their report to her majesty in council, by whom the judgment in the final instance is given.

In the practice of the common-law courts of England—that is, the court of queen's bench, the court of common pleas, and the court of exchequer, or, as is put by lord Coke, any court whose proceedings are regulated by the common law—the procedure by way of A. was, as stated at the beginning of this article, technically not so called, but was also called *error*, the party complaining of the judgment being called the plaintiff in error, instead of appellant, and his opponent, the defendant in error, instead of of respondent. Formerly, the proceedings commenced by suing out a writ of error first to a court of intermediate A., once the court of exchequer chamber, and afterwards by a further writ of error to the house of lords. But by the common-law procedure act of 1852 (15 and 16 Vict. c. 76, s. 148), writs of error are abolished, and now the word appeal is used in all cases indiscriminately.

Error also lies to the high court in criminal cases, when, *after judgment*, it is considered that the indictment is bad in substance, or that the judgment is erroneous, or in respect of any other substantial defect appearing on the face of the record. A court called the court for crown cases reserved, consisting of five judges, disposes of cases where the judge or court had some doubt at the trial as to a point of law. And there is also practically an appeal to a superior court from all magistrates' decisions on points of law.

As to redress by way of A. and error against the judgments in the courts of Ireland, the procedure is so similar to that hitherto employed with respect to the English courts, that we need not here enter into particulars on the subject. We may simply remark, generally, that the Irish chancellor, sitting alone, does not appear to exercise any appellate control over courts inferior to his own, such as that possessed by the chancellor in England; for, according to the Irish practice, the A., for instance, from the master of the rolls, and in the case of proceedings in bankruptcy, is not to the chancellor himself alone, but to the court of A. in chancery, in which the chancellor and a lord justice of A. are the appointed judges; and which court of A. likewise reviews the chancellor's own individual judgments. The judgments of this court of A. itself, however, may afterwards be reviewed on A. by the house of lords. In criminal procedure, the same act (11 and 12 Vict. c. 78) applies to Ireland as well as to England.

In the procedure of the Scotch courts, there are various appeals in the practice of the sheriff or county courts, and in the proceedings in bankruptcy; and the house of lords reviews the judgments of the court of session, the supreme civil court of the country, and which tribunal, indeed, it may be said, supplies the house with a large portion of its judicial business. This circumstance has frequently been remarked on as proving a litigious disposition on the part of the Scotch; but perhaps the greater number of Scotch appeals over English and Irish may be more fairly said to be occasioned by a natural feeling on the part of litigants and lawyers in Scotland, that there is a better chance of a nice and critical examination of the judgments appealed against by such judges as preside in the house of lords, whose legal and judicial minds have been formed under a different and larger system of jurisprudence than prevails in Scotland, than there would be to a tribunal composed entirely of Scotch lawyers. Indeed, although the judicial staff of the house of lords are chiefly English lawyers, the system of A. to their lordships from the Scotch courts works extremely well, and gives entire satisfaction to the Scotch people. Some of the most valuable elucidations of the peculiar principles of Scotch law are to be found in the judgments in Scotch appeals by the chancellors and other law lords who, since the union with Scotland, have administered the jurisdiction of the house in the last resort, but who were never in a Scotch court, and, until called upon to discharge such responsible functions, had nothing but English experience. In 1875 it was left uncertain whether Scotch and Irish appeals should continue to be to the house of lords, and settled in 1876 that they should.

There is no A. to the house of lords from Scotland in criminal cases, nor does the above-mentioned act—11 and 12 Vict. c. 78, creating a court of criminal A. for England and Ireland—extend to Scotland. But the high court of judicature there, which is the supreme criminal tribunal, and is composed of seven judges of the court of session, presided over by the lord justice general, or lord president, as he is otherwise called, reviews the procedure of all the criminal courts of the country (excepting where such jurisdiction is expressly excluded by statute); and it is believed that no inconvenience is experienced in consequence of there being no other or further A. from the sentences of these courts. In the United States an appeal is regularly understood to mean the re-hearing by a higher court of a cause or trial which has been decided in due form of law; or the removal to a higher court or authority of a cause pending. In practice, it is the removal of a cause from a court of inferior, to one of superior, jurisdiction, for the pur-

pose of obtaining a review and re-trial. It is, in its origin, a civil-law proceeding and differs from a writ of error in this: that it subjects both the law and the facts to review and re-trial, while a writ of error is a common-law process which removes only matter of law for re-examination. On an A. the whole case is examined and tried, as if it had not been tried before; while on a writ of error the matters of law only are examined, and judgment is reversed if any errors have been committed. An A. generally annuls the judgment of the inferior court so far that no action can be taken upon it until after the final decision of the cause. Rules regulating A. are various in various states. In New York, the court of appeals is the last resort; in the union, the supreme court of the United States.

APPENDIGITIS. See VERMIFORM APPENDIX.

APPENDIX VERMIFORMIS. See VERMIFORM APPENDIX.

APPENZELL' (from *Abbat's Cella*), a canton in the n.e. of Switzerland. Area, 162 sq. miles. Pop. '94, 68,515. It is divided into two districts — Inner-Rhoden and Ausser-Rhoden, the former of which is peopled by Roman Catholics, the latter by Protestants, and noted for its dense population. The surface is mountainous, especially in the s., where Mont Sentis attains an elevation of 8232 feet. The chief river is the Sittern, which flows through the center of the canton. A. holds the 13th place in the Swiss confederacy; the constitution of each half of the canton is a pure democracy. The inhabitants are chiefly employed in agriculture, cattle-keeping, cotton manufactures, etc.

APPENZELL, the capital of the canton of the same name, is situated on the left bank of the Sittern, in lat. $47^{\circ} 29' \text{ n.}$, and long. $9^{\circ} 24' \text{ e.}$

APPERCEPTION. See PÆDAGOGY.

APPERLEY, CHARLES JAMES, the "Nimrod" of the *Quarterly Review*, is a writer who deserves mention, if not from the intrinsic importance of the subjects on which he exercised his pen, at least from the perfection he attained in the department to which he confined himself. He was the son of a Welsh country gentleman, and was b. in Denbighshire in 1777. His education at Rugby stimulated his love of field-sports more than his love of the classics. At the age of 24, he married, and went to reside at Bilton Hall, in Warwickshire, where he devoted his energies as exclusively to the chase as the great Nimrod himself could have done. He hunted everywhere in Great Britain. In 1821, he began to contribute to the *Sporting Magazine*. His clever, gossiping articles were so much relished, that in two years that periodical doubled its circulation. The proprietor, Mr. Pittman, was of course highly gratified. He remunerated Mr. A. handsomely, kept a stud of hunters for him, and paid the expenses of his sporting tours; but "Nimrod" seems to have been of rather expensive habits, and to have occasionally required an advance of money from his employer. When Mr. Pittman died, his relatives entered into a lawsuit with the "mighty hunter," for the recovery of this money. Nimrod, however, prudently transferred himself to France, where he chiefly resided during the rest of his life. He d. on the 19th of May, 1843. His best writings are *The Chase, the Turf, and the Road*, which appeared in the *Quarterly Review* (1827).

APPERT, BENJAMIN NICOLAS MARIE, a French philanthropist, was b. in Paris, Sept. 10, 1797. He began his course in 1816 by introducing into several schools a system of mutual instruction, and, in 1820, founded and conducted gratuitously a school for the prisoners at Montauigu. Being suspected of having aided the escape of two prisoners, he was himself confined in the prison of La Force, where he made good use of his opportunities of becoming acquainted with the moral and physical circumstances of prisoners. After his liberation, he prosecuted his benevolent plans with renewed zeal, and undertook a journey through the whole of France, in 1825, to inspect schools, prisons, hospitals, etc. The results were given in his journal. After the July revolution, he was employed by Louis Philippe to superintend the measures taken for the relief of the indigent classes. In his travels, he visited Belgium, Prussia, Austria, Saxony, and Bavaria, and gave the results of his observations on the management of schools, hospitals, prisons, etc., in several works. He also wrote a work entitled *Dix Ans à la Cour du Roi Louis Philippe*, and, in his *Conférences contre le Système Cellulaire*, strongly opposed the system of solitary confinement. Though onesided in some of his views, A. is a sincere, warm-hearted, and practical philanthropist.

APPERT, FRANÇOIS, a French technologist, the inventor of a method of preserving meat, vegetables, and other articles of food without the use of salt or other chemical application. This method is fully described in his work *L'Art de Conserver toutes les Substances Animales et Végétales* (4th edition, Paris, 1831). D. 1840. See ANTISEPTICS.

APPETITE. See DIET: DIGESTION: FOOD AND DRINK.

APPIANI, ANDREA, styled in his day "the painter of the graces," was b. at Milan, May 23, 1754. His poverty compelled him to gain a subsistence by decorative painting; but in the course of his travels, he studied the works of great masters, and formed for himself an original style, almost rivaling that of Correggio. At Rome, he devoted his attention to the frescos of Raphael, and made such progress, that he soon excelled all living artists in fresco-painting. The best evidences of his genius are found in the cupola

of the church of *Sta. Maria di S. Celso* at Milan; and in the frescos with which he decorated the villa of the archduke Ferdinand in 1795. Napoleon I. appointed him court-painter. In return, he executed portraits of the French emperor and several of his generals. His most beautiful frescos are the paintings on the ceilings of the palace of Milan, which consist of allegorical illustrations of Napoleon's career; and Apollo with the muses in the villa Bonaparte. Almost all the palaces in Italy contain frescos by A. His finest oil-painting is Rinaldo in the garden of Armida. The fall of his patron, Napoleon I., left A. in indigent circumstances. He d. Nov. 8, 1817.

APPIANUS, a native of Alexandria, who flourished during the reigns of Trajan, Hadrian, and Antoninus Pius. He was author of a Roman history, in 24 books, of which only 11 are extant. It was not remarkable for anything except the plan on which it was written. Instead of proceeding to exhibit chronologically the growth of the empire, from its rude beginning on the Palatine hill, to the period when its power held the whole world in awe, which is at once the popular and the philosophical method, he divided his work into ethnographic sections, recording separately the history of each nation up to the time of its conquest by the Romans. First in order were the books devoted to the old Italian tribes, and afterwards followed the history of Sicily, Spain, Hannibal's wars, Libya, Carthage, and Numidia, Macedonia, Greece proper and its colonies, Syria, Parthia, the Mithridatic war, the civil wars, and the imperial wars in Illyria and Arabia. As a historian, A. is a mere compiler, and not very accurate in his compilation. His geographical knowledge, in particular, is singularly deficient, considering the age in which he lived. One specimen of his blunders will suffice: in his section on Spain, he states that it takes only half a day to sail from Spain to Britain. The edition of A. by Schweighäuser is highly esteemed, but the most complete is that in the *Bibliothèque Grecque* of Firmin Didot.

APPIAN WAY (Lat. *Via Appia*), well named by an ancient writer *regina viarum* (the queen of roads), was formed, in part at least, by Appius Claudius Cæcus, while he was censor (313 B.C.). It is the oldest and most celebrated of all the Roman roads. It led from the *Porta Capena* at Rome, in a southerly direction to Capua, passing through Three Taverns, Appii Forum, Terracina, etc. Subsequently, it was carried on to Beneventum, Tarentum, and thence to Brundisium. It had an admirable substructure or foundation, from which all the loose soil had been carefully removed. Above this were various strata cemented with lime; and, lastly, came the pavement, consisting of large hard hexagonal blocks of stone, composed principally of basaltic lava, and jointed together with great nicety, so as to appear one smooth mass. The remains of it are still visible, especially at Terracina. The cost must have been enormous, for the natural obstructions are great. Rocks had to be cut through, valleys filled up, ravines bridged, and swamps embanked.

APPIUS CLAUDIUS CRASSUS, a Roman decemvir (451-449 B.C.). While the other decemviri were engaged in repelling an incursion made by the Sabines, A. C. and his colleague Oppius remained in Rome, with two legions to maintain their authority. Meanwhile, A. C. had been smitten by the beauty of Virginia, daughter of a respected plebeian named Lucius Virginus, who was abroad with the army. By force and stratagem, representing that she was the born slave of Marcus Claudius, one of his clients, A. C. gained possession of the maid. His design was penetrated by Icilius, who was betrothed to Virginia, and who, aided by Numitorius, her uncle, threatened to raise an insurrection against the decemviri. Virginus, hurriedly recalled from the army by his friends, appeared and claimed his daughter; but, after another mock-trial, she was again adjudged to be the property of Marcus Claudius. To save his daughter from dishonor, the unhappy father seized a knife and slew her. The popular indignation excited by the case was headed by the senators Valerius and Horatius, who hated the decemvirate. The army returned to Rome with Virginus, who had carried the news to them, and the decemviri were deposed. A. C. died in prison by his own hand (as Livy states), or was strangled by order of the tribunes; his colleague, Oppius, committed suicide; and Marcus Claudius was banished. The *Claudia Gens* (see **GENS**) was one of the most numerous and important of the patrician tribes or clans of Rome; and besides the sons and grandsons of the decemvir, there were numerous persons of distinction who bore the name of Appius.

APPLE, *Pyrus malus*. (For the generic character, see **PYRUS**.) This well-known fruit has been very long cultivated, and by that means it has been very much improved. It was extensively cultivated by the Romans, by whom, probably, it was introduced into Britain. The wild A., or CRAB-tree, a native of America, and very generally found in temperate climates of the northern hemisphere, is a rather small and often somewhat stunted-looking tree, with austere, uneatable fruit, yet it is the parent of all, or almost all the varieties of apple so much prized for the dessert. The A.-tree, even in a cultivated state, is seldom more than 30 to 40 ft. high. It has a large round head; the leaves are broadly ovate, much longer than the petioles, woolly beneath, acute, crenate, and provided with glands; its flowers are always produced, 3 to 6 together, in sessile umbels, and are large, white, rose-colored externally, and fragrant. The fruit is roundish, or narrowest towards the apex, with a depression at each end, generally green, but also frequently yellow, light red, dark red, streaked, sometimes even almost black, with the rind

sometimes downy, sometimes glabrous, sometimes thickish, and sometimes very thin and transparent, varying in size from that of a walnut to that of a small child's head—the taste more or less aromatic, sweet, or subacid. It is produced on spurs, which spring from branchlets of two or more years' growth, and continue to bear for a series of years. The fruit of the A. is, with regard to its structure, styled by botanists a *pome* (q. v.). The eatable part is what is botanically termed the *mesocarp* (see FRUIT), which, in its first development, enlarges with the calyx, the summit of the fruit being crowned at last by the dried 5-parted limb of the calyx; the *endocarp* being, when ripe, cartilaginous, and containing in its cells seeds which do not correspond with them in size, but are so free as often to rattle when it is shaken.

The A. is now one of the most widely diffused of fruit-trees, and in the estimation of many, is the most valuable of all. It succeeds best in the colder parts of the temperate zone. It is, however, to be met with on the coasts of the Mediterranean Sea, in Arabia, Persia, the West Indies, etc., but there its fruit is as small and worthless as in high northern latitudes. The varieties in cultivation are extremely numerous. They have been classified with great care by recent German writers, by whom the classification and description of apples, pears, and similar fruits, has been treated as a sort of science, and dignified by the name of Pomology. Metzger, in his description of the pomaceous fruits of southern Germany, describes 89 different kinds of A., all of which are constant, besides sub-varieties. New varieties are continually produced; and as they are chiefly preserved and propagated by grafting—although some of them also grow by layers and cuttings—the old ones gradually die out. The *costard*, from which dealers in apples received the name of costardmongers, is no longer known. Many varieties are designated by the general names of *pippins*, *rennets*, *codlins*, and *calvilles*. Some kinds, not approved for the dessert, are in high esteem as baking-apples, and others still more acid or austere are preferred for the manufacture of Cider (q. v.).

The wood of the A.-tree is hard, durable, and fine-grained. The crab is often planted both as an ornamental tree and for the sake of its wood. The bark contains a yellow dye.—As a fruit-tree, the A. requires a fertile soil and sheltered situation. The various uses of the fruit—for the dessert, for baking, preserving, making jelly, etc., as well as for making the fermented liquor called cider—are sufficiently well known. Vinegar is also made from it; and sometimes a kind of spirit, especially in Switzerland and Swabia. It contains *malic acid*, which is extracted for medicinal purposes. The fermented juice of the crab A. is called *verjuice*. It is used in cookery, and sometimes medicinally; also for the purifying of wax. Apples are an important article of commerce. Great quantities are imported into Britain, chiefly from France, Canada, and the northern parts of the United States. The A. keeps better than most kinds of fruit.

Beaufins or *Biffins* are apples slowly dried in bakers' ovens, and occasionally pressed till they become soft and flat. They are prepared in great quantities in Norfolk.

The SIBERIAN CRAB is perhaps the parent, by hybridization or otherwise, of some of the varieties of A. now in cultivation. Two species partake this designation, both natives of Siberia, and frequent in gardens in Britain, *pyrus baccata* of Linnaeus, and *pyrus prunifolia* of Willdenow, which, however, scarcely differ, except that in the former the sepals (leaves of the calyx) are deciduous, in the latter they are persistent—a circumstance of very doubtful importance as a specific distinction. The fruit is sub-globose, yellowish, and rather austere, but is good for baking and preserves.

THE AMERICAN CRAB OR SWEET-SCENTED CRAB (*p. coronaria*) is a native of North America, especially of the southern part of the Alleghanies. It is a small tree with broad leaves and white flowers, becoming purple before they drop off, and which have a powerful smell, resembling that of violets. The fruit is flatly orbicular, of a deep green color, and sweet-scented. It is very acid, but is made into cider and also into preserves. *P. angustifolia*, a native of Carolina, much resembles this, but has much narrower leaves and smaller fruit.

THE CHINESE CRAB (*p. spectabilis*) is a small tree, a native of China. It is very ornamental when in flower; the flowers being in sessile, many-flowered umbels, and of a bright rose-color. The fruit is irregularly round, about the size of a cherry, yellow, and fit to be eaten, like the medlar, only when in a state of incipient decay.

APPLE OF SODOM. See SOLANUM.

APPLE-BRANDY. See APPLE-JACK.

APPLEBERRY. See BILLARDIERA.

APPLEBY, the co. t. of Westmoreland, lies in lat. 54° 35' n., long. 2° 28' w. It is in the n. of the co., on the river Eden, which flows past Carlisle into the Solway firth. A. has two parishes, one on each side of the river, which is here crossed by an old stone bridge of two arches. There is a castle in the t., the keep of which, called Cæsar's tower, is still in tolerable condition. The Lent and summer assizes are held at A. Until the passing of the reform bill, it returned two members to Parliament. It was then disfranchised, though it still possesses a municipal corporation. Pop. '81, 2899; '91, 1776.

APPLEGATH, AUGUSTUS, born near London in 1790, invented improved machines for printing. About 1846 he constructed a rotary vertical machine for printing the *London Times*. He died in 1871.

APPLE-JACK. A strong spirit distilled from cider, and also known as apple-brandy.

APPLETON, city and co. seat of Outagamie co., Wis., on the Chicago and Northwestern, and Chicago, Milwaukee, and St. Paul railroads, 100 miles n. w. of Milwaukee. It is situated on the Grande Clute of the Fox River, which by a series of dams is everywhere navigable for steamboats. A canal between the Fox and Wisconsin Rivers is the route of the Green Bay and Mississippi Company. The city is furnished with a large water-supply. The chief industries are paper, saw, flour, and woolen mills, and manufactures of furniture, machinery, and farming implements. The town contains banks, churches, and publishes daily, weekly, and monthly periodicals. It is the seat of Appleton college and Lawrence University. Pop. '90, 11,958.

APPLETON, DANIEL, 1785-1849; b. Mass. He was in business as a trader in Haverhill and Boston, and lastly at New York, where he was the head of the important publishing house of "D. Appleton & Co.," building up an immense business, which is still continued by his descendants.

APPLETON, GEORGE SWETT, 1821-78; son of Daniel, an American publisher. At the age of 19 he went abroad; he spent four years at the university of Leipsic, devoting himself to literary and historical researches, and the languages of France, Italy, and Germany. He began business alone in Philadelphia, but in 1849, with three brothers, John, William, and Sidney, succeeded to his father's large publishing business in New York. Among numerous publications which have given this house its high standing, the *American Cyclopædia* is conspicuous.

APPLETON, JESSE, D.D., 1772-1819; b. N. H.; a theologian, educated at Dartmouth, and in 1797 ordained pastor of a Congregational church in Hampton, N. H. From 1807 to 1819 he was president of Bowdoin college. He was often called to preach before missionary, peace, and Bible societies, and other public bodies. Franklin Pierce, president of the United States (1853-57), was his son-in-law. His sermons and other works have been published by another son-in-law.

APPLETON, NATHAN, LL.D., 1779-1861; b. N. H.; a merchant and manufacturer, and writer on finance. He, with others, started the first power-loom for weaving cotton in the United States. He was one of the Merrimac company whose enterprise founded the city of Lowell. He served several terms in the Massachusetts legislature, and in 1830 was sent to congress, where he was one of the prominent advocates of a tariff for protection. He was again elected to congress in 1842. He published a treatise on currency and banking, a history of the introduction of the power-loom, and the early history of Lowell.

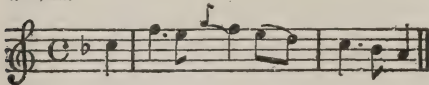
APPLETON, SAMUEL, 1766-1853; b. N. H.; an eminent philanthropist, brother of Nathan. He was one of a family of 12 children, and passed his boyhood on a farm, but managed to get sufficient education to become a teacher at the age of 17. In 1794, he and his brother Nathan went into the English trade, in Boston, and afterwards added ventures in cotton manufacture, in which they made a great fortune for those times. He travelled for more than 20 years in other countries, and retired from active business in 1823, devoting his entire income to benevolent and scientific purposes, for which he bequeathed \$200,000.

APPLETON, THOMAS GOLD, 1812-84; son of Nathan; bro.-in-law of the poet Longfellow; a noted wit and *raconteur* of Boston, a public-spirited citizen who contributed money and influence to many of the literary and scientific institutions of that city, an amateur painter of some distinction, and the author of *A Nile Journal*, *Syrian Sunshine*, *A Sheaf of Papers*, *Windfalls*, etc.

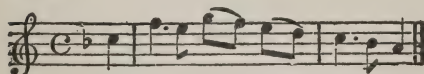
APPLING, a co. in s.e. Georgia, 1074 sq.m.; pop. '90, 8676, inclu. colored. Co. seat, Baxley.

APPLIQUÉ (Fr., *appliquer*, to put on), in needlework denotes a pattern cut out from one foundation and applied to another.

Written.



Played.



For APPOGIA'TO, see PORTAMENTO.

APPOINTMENT. In the law of England there are frequently reserved in common law conveyances granted on a consideration, and in family settlements, certain *powers*, as they are called, such as powers of jointuring, selling, charging land with the payment of money; and the subsequent exercise of the power is called an A. This A.—which may be made either by deed or by will—is not considered as an independent conveyance, but is merely ancillary to the deed or instrument in which the power of A. is reserved, and from which the party in whose favor the A. is made for most purposes derives his title. The courts of equity give relief against a defective A., or defective execution of

APPOGIATU'RA, an Italian musical term, designating a form of embellishment by insertion of notes of passage in a melody. The A. notes are printed in a smaller character than the leading notes of the melody, and should always be given with considerable expression. When they are extemporized by a performer or singer, they serve as an indication of good or of bad taste. The time of an A. is taken from the essential note to which it belongs.

a power, where there is what is called a "meritorious consideration" in the person applying for such relief. As to what amounts to such meritorious consideration, lord St. Leonards, in his work on powers, lays down that equity will relieve the following parties: 1. A purchaser, including in such term a mortgagee and lessee; 2. A creditor; 3. A wife; 4. A legitimate child; and 5. A charity. But in the case of a defective A. by a wife in favor of her husband, there is no relief in equity; nor is the equity extended to a natural child; nor to a grandchild; nor to a father or mother, or brother or sister, even of the whole blood, much less of the half-blood; nor to a nephew or cousin. Against the legal consequences of an A., the courts of equity give no aid.

In the Scotch law, the expressions *reserved power* and *faculty to burden* correspond to the English phrase "power of A.," and the deed or instrument subsequently executed in virtue of the reserved power, is simply described according to the nature and quality of the conveyance so made; but the term A. is not a technical word in Scotland.

APPOINTMENTS. The "A." of a ship are, collectively, all her various articles of equipment and furniture. In like manner, the "A." of a soldier, especially a trooper, comprise many miscellaneous necessities which can come collectively under no other name, but which, in part, will be found noticed under later headings. See **EQUIPMENT**, **KIT**, **KNAPSACK**.

APFOLD, JOHN GEORGE, 1800-65; an English civil engineer. His chief inventions are centrifugal pumps for drainage, a process for dressing furs, and an apparatus for paying out submarine telegraph wire, which was very useful in laying the Atlantic cable. He made also many curious automatic machines for opening doors, etc.

APPOMAT TOX, a co. in s.e. Virginia; 317 sq.m.; pop. '90, 9589, inclu. colored. Its surface is rough, much of it covered with timber, but the soil is fertile and adapted to wheat, corn, oats, and tobacco. The Norfolk and Western railroad runs through it. Co. seat, West Appomattox.

APPOMAT TOX COURT HOUSE. A village in A. co., Va., where the confederate Gen. Lee surrendered to Gen. Grant, April 9, 1865, ending the civil war. It is about 25 m. east of Lynchburg, and on the Norfolk and Western railroad.

APPONYI, GYÖRGY, a Hungarian statesman, b. 1808. He was a member of the Presburg diet of 1843, and chancellor of Hungary in 1847, when he opposed the revolutionary movements then breaking out, and which caused his retirement. In 1859 he was made a member of the imperial council in Vienna, and was instrumental in bringing about the reconciliation between Austria and Hungary. He is a leading conservative, and is classed among the ablest of European statesmen.

APPOQUINIMINK, a hundred (t. or township) in Delaware; pop. '90, 2336.

APPORTIONMENT BILLS, in the United States, are laws of congress after each decennial census, to define the number of members of the house of representatives to which the several states are entitled. Every state has at least one member. Eleven A. B. have been passed. The first constitution adopted by the original 13 states fixed the number of members at 65, and the number of representative population required to be entitled to a member at 30,000. Representative population then meant all free white citizens and three fifths the number of slaves; two fifths of the slaves, all aliens, and Indians not taxed, were excluded from any share in choosing members of congress. The extinction of slavery has made all colored people, except the very few aliens among them, representative citizens. The following figures show the variations of apportionment made for each census.

Period.	States.	Members.	Pop. to a member.	Period.	States.	Members.	Pop. to a member.
1789.....	13	65	30,000	1840.....	26	223	70,680
1790.....	15	105	33,000	1850.....	32	234	93,423
1800.....	16	141	33,000	1860.....	34	243	127,381
1810.....	17	191	33,000	1870.....	37	293	131,425
1820.....	24	213	40,000	1880.....	38	325	151,913
1830.....	24	240	47,700	1890.....	44	356	173,901

The house had grown rapidly in number of members until 1830, when it was found that it would soon become unwieldy unless the number required to a member should be largely increased; so the ratio was nearly doubled (raised from 47,700 to 70,680). Since then the purpose has been to keep the house below 300 members, and the ratio is raised regularly, while the number of members is seldom increased unless by the addition of new states. In that way the house was increased by the admission of Oregon in 1859, Nebraska and Nevada in 1863, and Colorado (making the 38th state) in 1876. A. B. are passed in the states for the distribution of the state senators and assemblymen, after certain periods, generally of 10 years intermediate with the federal period. Thus New York apportioned after enumerations of 1845-'55-'65-'75.

APPOSITION, a term in grammar signifying the annexing of one substantive to another, in the same case or relation, in order to explain or limit the first; as, *my brother, the physician*; *Thomas the Rhymers*. Whole sentences or clauses admit of A.: thus, "Napoleon sought the way to India through Russia, a stroke of genius." Sometimes a connecting word is used where logical propriety would require A.; as, *the city of London*, for *the city London*.

APPRAISERS and APPRAISEMENT. In the United States the law requires the appraisement of property of insolvents and decedents in certain cases; of property taken from public use or for corporations, and in most states, of property seized by creditors. There are many uses for appraisement in private business, the parties mutually agreeing as to how and by whom it shall be done. In litigated causes, and where the public are concerned, courts appraise, or name persons to do so.

APPREHEND. This term, in its strictest sense, is applied to taking into custody in criminal cases, and arrest in civil actions. In practice, however, the distinction is not followed, and both are included under the term *arrest*. The provisions of law which govern arrests are purely statutory, and vary in the different States. In general, arrests may be made:

1st. By a peace officer under a warrant. The officer should inform the offender that he acts under a warrant, and, if required, must exhibit it. Such an officer may break open any door or window of any building to execute the warrant.

2d. By a peace officer, without a warrant. This may be done when the crime is committed in the officer's presence, or when the person has committed a felony, or when there is reasonable ground for believing that he has.

3d. By a private person. This may be for a crime committed in his presence, or when he knows that the person has committed a felony, although it was not done in his presence. Any officer may call upon a citizen to aid him in executing a warrant, and the person summoned must lend his assistance. Arrests for minor offenses, called misdemeanors, will not in general be made in the night-time nor on Sunday, except by special authorization of a magistrate, and except, of course, where the offender is taken in the act. This rule does not apply to felonies.

APPRENTICE is a person described in law-books as a species of servant, and called *A.* from the French verb *apprendre*, to learn, because he is bound by indenture to serve a master for a certain term, receiving in return for his services instruction in, or learning his master's profession, art, or trade; the master, upon the other hand, contracting to instruct the *A.*, and, according to the nature of the agreement, to provide food and clothing for the *A.*, and to pay him small wages. Sometimes a premium is paid by the *A.*, or on his behalf, to the master.

In the United States the system of apprenticeship has largely gone out of use in recent years, and regular indentures and serving of time are now little heeded; but there are laws regulating the business in most of the states. The New York statutes—which may be taken as generally resembling those in many other states—provide that males under 18 and unmarried females under that age may, with consent of natural or legal guardians, or of their own motion, bind themselves as *A.*, but for no longer than until they become of age (males at 21, and females at 18). Consent comes from father, mother, guardian, overseers of the poor, or officers legally qualified, such as the commissioners of charity and correction. Consent of the mother must be had in writing if she be living and not incapacitated. Regular indentures are provided, and specific agreements must be made by both parties, the main provisions of which are that the *A.* shall serve the term specified; if he run away he may be compelled to return; the master shall provide proper support and medical service; shall teach or cause to be taught the business intended; and give a certificate of full service of the term. Indentures are canceled, or annulled only by death, or legal process. An absconding *A.* may be arrested, and on refusing to return may be sent to the house of correction or jail; or, if the *A.* willfully refuse to perform his portion of the contract, the agreement may be canceled, the *A.* forfeiting all claims. On the other hand, neglect, cruel treatment, or refusal to instruct on the part of the master, may be punished by damages, by canceling indentures, or by fine for the benefit of the *A.* or his parent or guardian. Managers of asylums or homes for indigent children usually have power to bind out. Indentures always require the master to provide a certain amount of education, and imply freedom in religious opinion and choice of church. There is a special section which declares that no person shall accept from any *A.* or journeyman any agreement, or cause him to be bound by oath, or in any manner, that after his term expires, he will not exercise his trade in any particular place or manner; nor shall any one take money or value from an *A.* for permitting him to use his trade in any place.

APPRENTICE, NAVAL. Apprentices are enlisted for the naval service between the ages of 14 and 18 to serve until they reach 21 years of age. Minors between the ages of 14 and 18 are not enlisted without the consent of their parents or guardian. The applicant must be of robust frame, intelligent, of perfectly sound and healthy constitution, free from all physical defects or malformation, and not subject to fits. They must also be able to read and write. In special cases where the boy shows a general intelligence and is otherwise qualified, he is enlisted, notwithstanding his reading and writing are imperfect.

Boys are enlisted as third-class apprentices at the rate of \$9 per month and one ration. While serving on the training-ships they may, if deserving, be promoted to the rating of second and first-class apprentice, at the pay of \$10 and \$11 per month, and on cruising vessels to the ratings of seamen apprentice, second or first-class, at the pay of \$19 and \$24 per month, respectively, as a reward of proficiency. When first received

on board of a training-ship they are furnished, free of cost, with an outfit of clothing not exceeding in value the sum of \$45. This outfit is furnished on the supposition that the apprentice will serve during his minority. Should he be discharged at his own request prior to the completion of his term at the Training Station and the first practice cruise, he must refund the value of the outfit. Apprentices are transferred to sea-going ships as they become proficient, and upon the expiration of their enlistments they receive, if recommended, an honorable discharge and continuous service certificate. As soon as practicable after the apprentices are enlisted, they are forwarded to the *Naval Training Station* at Newport, where they receive instruction in English Studies and in the rudiments of the profession of a seaman, for the period of six months. At the termination of this period the apprentices are transferred to the cruising training ships. There are three departments of instruction and training—seamanship, gunnery, and English, the last embracing reading, writing, spelling, geography, history, and arithmetic. There is also special instruction as buglers, carpenters, sailmakers, and blacksmiths. When apprentices are to be discharged their parents or guardians are informed, and ample time is allowed them to come themselves or send means to defray the traveling expenses. The course of instruction on board the *Cruising Training Ships* is of six months' duration. The apprentices are advanced to the rating of seaman-apprentice second-class, as a reward for proficiency and aptitude, provided that there is physical and professional qualification to perform the duties of an ordinary seaman. The instruction begun at the shore station is continued aboard the cruising vessels with an increase of practical work. When transferred to the regular service cruisers the instruction is still continued, and the apprentices are regularly examined before being advanced in rating. Should the term of enlistment of an apprentice expire while he is abroad, he is to be sent immediately to the United States, unless he desires to re-enlist.

APPROACHES, in military language, are the sunken trenches or excavated roads which are constructed by besiegers. The siege camp being usually at a considerable distance from the fortress or city attacked, the soldiers would be exposed to imminent danger while hastening across a belt of open country to enter any breaches made by the large siege guns, were it not that concealed roads are first constructed along which they may approach. In some cases the A. are not actual trenches, but merely paths shielded by a piled-up wall of sand-bags, fascines, gabions, wool-packs, or cotton-bales. The most tremendous combination of A. ever known in the history of military enterprise was at the siege of Sebastopol in 1854-5.

APPROPRIATION is the opposite of expropriation, and means making something the property of a particular person, e.g., game, which is the property of no one, is appropriated by capture; or one man is said to appropriate the ideas of another. The word has various important applications in law. (1) When so much iron or oil, for instance, has been sold, but the quantity is not separated by weight or measurement from a larger mass; or where a certain quantity is sold, but the exact proportion or price is not known until measurement, etc.; in such cases the risk of the goods perishing and the substantial ownership do not pass to the buyer. Before delivery, however, the goods may be appropriated so as to produce this effect. (2) When a bill is drawn against goods, and the bill of lading is sent as a security to the acceptor, the goods are said to be appropriated to the payment of the bill. (3) Where several debts are due to the same creditor, the general rule is that when the payment is voluntary and not under process of law, the debtor, in making a payment, may appropriate it to a particular debt. If he does not do so, the creditor may elect to which debt to apply it. Where the parties say nothing, the law appropriates the payments in order of date. When the payment is made under compulsion, the rules as to election give way, and the money should be applied ratably to all the claims. In church law, appropriation is the setting apart of an ecclesiastical benefice to the peculiar and permanent use of some religious body. The owner of a benefice is termed an appropriator, e.g., the lay rector, who receives the tithes, but is bound to appoint a vicar or perpetual curate for the spiritual service of the parish. In the constitutional law of England, appropriation means the principle that "supplies granted by Parliament are only to be expended for particular objects specified by itself." This principle was acted on by the Commons during the Commonwealth, was definitely established during the Dutch war of 1665, and since the reign of William III. has been expressed in the Annual Appropriation Act by a clause prohibiting the treasury officials from applying public money to any service other than that to which it has been specially appropriated.

APPROXIMATION, a term commonly used in mathematical science to designate such calculations as are not rigorously correct, but approach the truth near enough for a given purpose. Thus in logarithmic and trigonometrical tables nearly all the numbers are mere approximations to the truth. The calculations of astronomy generally are of this nature. Even in pure mathematics there are parts in which approaches to the truth, by means of interminable series, are all we are able to gain. The solution of equations beyond the fourth degree can be got only by approximation.

APPUI (French), a stay or support. In military tactics, the *points d'A.* are such parts of the field of battle as are suited to give support or shelter. As the wings of an army (like the extreme sides of a chess-board) are the weakest points of resistance to attack, they especially require support or protection, and are placed, when it is possible, in

localities which serve to obstruct the attacking forces. Lakes, morasses, woods, streams, and steep declivities may thus serve as *points d'A*.

APPULEIUS, or, less properly, **APULEIUS**, a satirical writer of the 2d c., was b. at Madaura, in Africa, where his father was a magistrate, and a man of large fortune. A. first studied at Carthage, which at that time enjoyed a high reputation as a school of literature. Afterwards he went to Athens, where he entered keenly upon the study of philosophy, displaying a special predilection for the Platonic school. The fortune bequeathed to him at his father's death enabled A. to travel extensively. He visited Italy, Asia, etc., and was initiated into numerous religious mysteries. The knowledge which he thus acquired of the priestly fraternities, he made abundant use of afterwards in his *Golden Ass*. His first appearance in literature arose from a lawsuit. Having married a middle-aged lady, named Pudentilla, very wealthy, but not particularly handsome, he drew down upon his head the malice of her relations, who desired to inherit her riches, and who accused the youth of having employed magic to gain her affections. His defense (*Apologia*, still extant), spoken before Claudius Maximus, proconsul of Africa, was an eloquent and successful vindication of his conduct. After this event, his life appears to have been devoted zealously to literature and public oratory, in both of which he attained great eminence. He was so extremely popular, that the senate of Carthage, and other states, erected statues in his honor.

The *Golden Ass*, the work by which his reputation has survived, is a romance or novel, whose principal personage is one *Lucian*, supposed by some, though on insufficient evidence, to be the author himself. It is generally understood to have been intended as a satire on the vices of the age, especially those of the priesthood, and of quacks or jugglers affecting supernatural powers, though bishop Warburton, and other critics, fancy they can detect in it an indirect apology for paganism. Its merits are both great and conspicuous, as are also its faults. Wit, humor, satire, fancy, learning, and even poetic eloquence abound, but the style is disfigured by excessive archaisms, and there is a frequent affectation in the metaphors, etc., which proves A. to have been somewhat artificial in his rhetoric. The most exquisite thing in the whole work is the episode of Cupid and Psyche (imitated by La Fontaine). It is supposed to be an allegory of the progress of the soul to perfection. Besides the *Apologia* and *Golden Ass*, we have from the pen of A. an anthology in four books, a work on the Dæmon of Socrates, one on the doctrines of Plato, one on *The Universe*, etc. A considerable number of his works also are lost. The most recent and careful edition of the whole works of A. is that published at Leipsic in 1842, by G. F. Hildebrand. The *Golden Ass* was translated into English by T. Taylor (1822), and again by Sir G. Head (1851). An English version of the works of A. was published in London, 1853.

APPURTENANCES, things belonging to another thing as principal, and which pass as incident to the principal thing. Thus in the conveyance of a house and land, everything passes which is necessary to the full enjoyment thereof; and in such case the term includes the right of way, etc. In general it means anything necessary to the full possession and enjoyment of the principal thing. In case of a ship, the usual furniture and things necessary for using the vessel are A.—the boats, sails, anchors, etc.; but it has been held that ballast was not appurtenant.

APRAXIN, STEFAN FEDOROVITCH, 1702–58; a Russian general. In his youth he served against the Turks, gaining rapid promotion. In Elizabeth's court he was a strong opponent of Prussian influence, and in the seven years' war led an army against Frederick the Great, invading Prussia, and capturing Memel. In the midst of success he retreated, and joined the conspiracy to raise Paul to the Russian throne over his father, who was the legitimate heir. He was tried by a court-martial, but died in prison before the end of the cause.

APRAXIN, THEODOR MATVAYEVICH, a distinguished Russian admiral, was b. in 1671. When hardly 12 years of age, he entered the service of Peter the Great, who conceived a great attachment for him, which lasted during the whole life of the monarch. In 1699, he took part in the first maneuvers of the Russian fleet at Taganrog on the sea of Azof. After the year 1700, he became the most powerful and influential person at the court of the czar, who made him chief-admiral of the Russian navy, of which, in fact, A. may be considered the creator. While Peter was fighting the Swedes in the north, A. was building war-vessels, fortresses, and wharves in the south. In 1707, he was appointed president of the admiralty; in 1708, he defeated the Swedish general, Lübecker, in Ingermannland, and saved the newly-built city of Petersburg from destruction; in 1710, he captured the important t. of Viborg, in Finland; and in 1711, commanded in the Black sea during the Turkish war. The following year he returned to the north; and in 1713, with a fleet of 200 vessels, he sailed along the coast of Finland, took Helsingfors and Borgo, and defeated the Swedish fleet. The result of his great successes was that at the peace of Nystadt, in 1721, Russia obtained some most valuable advantages, being confirmed in her possession of Finland, just conquered, and of Esthonia. In spite of his brilliant reputation, however, he twice suffered an apparent eclipse of imperial favor. In 1714–15, he was charged with embezzlement, tried, and condemned to pay a fine; and a few years later, was denounced by Peter himself as "an oppressor of the people," and again condemned to pay a fine; but his services were too useful to be dispensed with.

and in both instances the czar neutralized the effect of the condemnation, by conferring upon him additional richness and dignities. In 1722, he accompanied Peter in his Persian war, and was present at the siege of Derbend. His last naval expedition was in 1726, when he repaired with the Russian fleet to Revel, to defend that place against an expected attack by the English. He d. at Moscow, 10th Nov., 1728, in the 57th year of his age.

APRICOT, *Prunus armeniaca*, a species of the same genus with the plum (q.v.), is a native of Armenia, and of the countries eastward to China and Japan; a middle-sized tree of 15 to 20 or even 30 ft. high, with ovate, acuminate, and cordate, smooth, doubly-toothed leaves on long stalks; solitary, sessile, white flowers, which appear before the leaves, and fruit resembling the peach, roundish, downy, yellow, and ruddy on the side next the sun, with yellow flesh. The A. was brought into Europe in the time of Alexander the great, and since the days of the Romans has been diffused over all its western countries. It has been cultivated in England since the middle of the 16th century. It is only in the s. of England that it is ever trained as a standard, nor is it grown in the more northern parts, even as an espalier, but almost always as a wall-tree. More than 20 kinds are distinguished, amongst which some excel very much in size, fine color, sweetness, and abundance of juice. The *Moorpark* is generally esteemed the finest variety, and the *Breda* as best suited for standards in the s. of England, and in Scotland even for the wall, except in the most favorable situations.—The A. is generally budded on plum or wild cherry stocks. The fruit keeps only for a very short time, and is either eaten fresh, or made into a preserve or jelly. Apricots split up, having the stone taken out, and dried, are brought from Italy as an article of commerce, in particular from Trieste, Genoa, and Leghorn; in the s. of France, also, they are an article of export in a preserved and candied state. Dried apricots from Bokhara are sold in the towns of Russia, the kernels of which are perfectly sweet, like those of the sweet almond. The kernels are sweet in some kinds, and bitter in others—the bitterness being probably more natural, and the sweetness, as in the almond, the result of cultivation. Generally speaking, they may be used for the same purposes as almonds. From the bitter kernels, which contain prussic acid, the *caru de noyau* is distilled in France. The charred stones yield a black pigment similar to Indian ink. The wood of the tree is good only for the purposes of the turner.

The **BRIANÇON A.**, *Prunus brigantiaca*, very much resembles the common A. The fruit is glabrous. It is found in Dauphiné and Piedmont. At Briançon, an oil, called *huile de marmotte*, is expressed from the seeds.

The **SIBERIAN A.**, *P. sibirica*, is also very like the common A., but smaller in all its parts. The fruit is small. It is a native of Siberia, especially of the southern slopes of the mountains of Dahuria.

The A. plum is an excellent kind of plum, much cultivated in some parts of France, and which, preserved in sugar, dried, and packed in shallow boxes, forms a considerable article of trade.

A'PRIES, king of Egypt, the Pharaoh-Hophra of the time of Zedekiah and Nebuchadnezzar. He invaded Syria, but gained no substantial advantages. Herodotus says he was so vain and confident of his power that he would not believe that even a deity could overcome him. His fall was predicted by Jeremiah (xlv. 30), and it came through the revolt of his troops, who took Amasis for their leader, and made A. a prisoner, 569 B.C. Amasis saved his life for a time, but was compelled to give him over to his enemies, who strangled him.

APRIL. The Romans gave this month the name of *Aprilis*, from *aperire*, to open, because it was the season when the buds began to open; by the Anglo-Saxons it was called Ooster, or Easter-month; and by the Dutch, Grass-month. The custom of sending one upon a bootless errand on the first day of this month, is perhaps a travesty of the sending hither and thither of the Saviour from Annas to Caiaphas, and from Pilate to Herod, because during the Middle Ages this scene in Christ's life was made the subject of a miracle-play (q.v.) at Easter, which often occurs in April. It is possible, however, that it may be a relic of some old heathen festival. The custom, whatever be its origin, of playing off little tricks on this day, whereby ridicule may be fixed upon unguarded individuals, appears to be universal throughout Europe. In France, one thus imposed upon is called *un poisson d'Avril* (an A. fish). In England, such a person is called an A. fool; in Scotland, a gowk. Gowk is the Scotch for the cuckoo, and also signifies a foolish person. The favorite jest in Britain is to send one upon an errand for something grossly nonsensical—as for pigeon's milk, or the history of Adam's grandfather; or to make appointments which are not to be kept; or to call to a passer-by that his latchet is unloosed, or that there is a spot of mud upon his face. When he falls into the snare, the term A. fool or gowk is applied with a shout of laughter. It is curious that the Hindoos practice precisely similar tricks on the 31st of March, when they hold what is called the Huli festival.

A-PRIO'RI reasoning or demonstration is that which rests on general notions or ideas, and is independent of experience. Reasoning from experience is called *a-posteriori* reasoning. A predilection for one or the other of these forms of reasoning forms one of the most important distinctions among schools of philosophy. Plato may be taken as

typical of the A-P. school, Locke and Bacon of the other. A-P. speculation is more in accordance with the genius of the Germans than with that of the practical British. A-P. philosophy claims for its conclusions the character of necessary truths, and denies that there can be A-P. proof of anything, that kind of reasoning furnishing only a confirmation or verification. The opposite school maintain that the general notions or principles on which A-P. reasoning rests, are themselves the results of experience, and that, therefore, all truth rests really on A-P. grounds.

APRON. A rectangular piece of lead, with a conical projection on the under side, used to cover the vent in heavy guns and field pieces.

A composition cover made to fit over the lock of cannon.

The platform on which the sill of a dock is fastened down.

A piece of curved timber placed in a ship just above the foremost end of the keel, to join together the several pieces of the stern. It extends from the head to some distance below the scarf.

APSE (Lat. *apsis*), a semicircular recess usually placed at the east end of a choir or chancel of a romanesque, or what is commonly called in England an Anglo-Saxon or Anglo-Norman church. The origin of this peculiar termination to the choir is so curious, and has been so clearly established by recent German writers, that we shall endeavor to state it in a very few words. It is well known that the heathen structure from which the early Christians borrowed the form of their churches was not the temple, but the basilica or public hall which served at once for a market-place and a court of justice. The basilica, for the most part, was a parallelogram, at one of the shorter sides of which, opposite to the entrance, there was a raised platform destined for the accommodation of the persons engaged in and connected with the distribution of justice. This portion of the building was the prototype of the rounded choir, to which the name of *A.* was given, and which is still to be seen in so many of the Rhenish churches. For the prætor's chair, which was placed in the center of this semicircular space, the altar was substituted; and the steps which led to the seat from which he dispensed justice, were destined henceforth to lead to the spot where the fountain of all justice should be worshipped. Many *A.* are to be met with in English churches, an enumeration of which will be found in Mr. Parker's excellent glossary of architecture. But as the structure is not only much more frequent, but continued to be used to a much later period on the continent, we shall describe it as it may still be seen in almost every little village along the banks of the Rhine. The lower part of the *A.* is there usually pierced by two or three round arched windows, often of irregular size and height, over which there is invariably an external gallery supported by pillars, in the form of which the rude idea of a Roman pillar is at once apparent; and the whole is joined to the end of the nave, which rises considerably above it, by a roof in the form of the segment of a cone. Where the churches are larger, there is a complete row of windows of the same rounded form, divided by pillars similar to those by which the gallery is supported, and under them frequently a line of arches of corresponding construction, whilst one or two small and irregular holes of the same form give a scanty light to the crypt beneath. Many of the smaller churches have no aisles; and the semicircular *A.* forms the termination of, or rather contains the chancel. The more complete specimens of the style, however, such as the minster at Bonn, afford—with the exception of the transepts and the towers, which are later additions—about the most perfect examples to be found on this side the Alps of the form of the Roman basilica, as first adapted to Christian uses. Several examples of the *A.* are to be seen in the earlier ecclesiastical structures of Scotland; as instances, we may mention the churches of Dalmeny and Kirkliston in Linlithgowshire, and of Leuchars in Fife.

AP SIDES (Gr. *apsis*, connection), the two extreme points in the orbit of a planet—one at the greatest, the other at the least distance from the sun. The term *A.* is also applied in the same manner to the two points in the orbit of a satellite—one nearest to, the other furthest from, its primary; corresponding, in the case of the moon, to the perigee and apogee. A right line connecting these extreme points is called the line of *A.* In all the planetary orbits, this line has no fixed position in space, but makes a forward motion in the plane of the orbit, except in the case of the planet Venus, where the motion is retrograding. This fact in the orbit of the earth gives rise to the anomalistic year (q.v.). This advancing motion of the line of *A.* is especially remarkable in the orbit of the moon, where it amounts to $40^{\circ} 40' 32'' \cdot 2$ annually, an entire revolution thus taking place in rather less than nine years.

APSLEY, a river of Australia, in the n. division of New South Wales. It is a tributary of the river Macleay (formerly sometimes called *A.*), which reaches the Pacific at Trial bay, 30 m. n. of Port Macquarie.—*A.* is also a strait between Melville and Bathurst islands, on the n. coast of Australia. Its length is 48 m., with a width varying from 1½ to 4; and the depth of its channel is from 8 to 24 fathoms.

AP TERAL, applied to temples of the Greeks and Romans which had no lateral columns, though there may have been columns at the ends.

AP TEROUS INSECTS are insects without wings. In the Linnæan system, the *aptera* form an order of insects; but more important distinctive characters being found to

belong to the insects included in it, it is no longer retained as an order or principal division in the most improved entomological systems.

APTERYX (from the *Gr.* *a*, priv., and *pteryx*, a wing), a genus of birds allied to the ostrich and emu, and perhaps more nearly to the extinct dodo. It has a very long and slender bill, of which it makes a remarkable use in supporting itself when it rests. It has three anterior toes, and a posterior one which is scarcely developed. The legs are of moderate length, the wings merely rudimentary. The feathers have no accessory plume. The diaphragm is more complete than in any other known bird. One species is well known (*A. australis*), about the size of a goose, a native of New Zealand. It is a nocturnal bird, and preys on snails, insects, etc. It is much prized for its feathers. The natives call it *kivi-kivi*, from its cry. See *illus.*, ANTELOPES, ETC.

APTHE are small vesicles formed of the superficial layer of a mucous membrane, elevated by fluid secreted by the latter. They are usually whitish in color, and the fluid may be serous or puriform. At the end of a few hours or days, the apthous vesicle bursts at its summit, and shrivels up, exposing an inflamed and painful patch of the mucous membrane. The most common site of *A.* is the mucous membrane of the lips and mouth, but they occasionally appear wherever mucous membrane approaches the skin. Infants are liable to an apthous eruption termed *thrush* (q.v.). *A.* in adults are generally the consequences of fevers and other diseases, or a symptom of disturbance of the digestive system. In some cases of pulmonary consumption, they form a painful addition to the patient's sufferings.

APULIA, a part of ancient Iapygia (so named after Iapyx, son of Dædalus), now includes the south-eastern part of Italy as far as the promontory of Leuca, and also the extreme peninsula of Calabria. Here, in ancient times, lived three distinct peoples—the Messapians or Salentini, the Peuceni, and the Daunians or Apulians. According to old Latin traditions, Daunus, king of the Apulians, when banished from Illyria, settled in these parts of Italy. Later traditions say that Diomedes, the Ætolian, with several other heroes returning from the Trojan war, came to Italy, and, in his war with the Messapians, was assisted by Daunus, but was afterwards deprived of his territory, and put to death. Roman poetry has preserved these old names; but in history, no mention is made of any kind of *A.*, though we find the names of its principal cities—Arpi, Luceria, and Canusium. The second Punic war was for some time carried on in *A.* In the present day, *A.* (now styled PUGLIA) is merely the name of a geographical district, and has no political meaning. The whole territory, including the Neapolitan provinces, Capitanata, Terra di Bari, Terra d'Otranto, etc., is but a shadow of its former self, in the time of the Greek colonies, under Roman dominion, or even under the Normans, who took possession of it in 1043 A.D. The towns are depopulated, industry has disappeared, and commerce, once so flourishing, has passed away. Agriculture is in a very low condition, and the few roads are infested by banditti. The people are generally ignorant and superstitious, but deserve praise for their hospitality to travelers.

APURE, a river of the United States of Colombia and Venezuela, which rises in the *e.* Andes, near lat. 7° n., and long. 72° w. After receiving the Portuguesa and the Guarico from the n., it joins the Orinoco in lat. 7° 40' n., and long. 66° 45' w. It waters the towns Nutrias and San Fernando.

APURE, a former province in Venezuela, bordering on Colombia; 22,250 sq. m.; pop. '81, 21,112. Capital, San Fernando de *A.*

APURIMAC, a river of Peru, which, after a course of 500 m., assumes the name, first, of Tambo, and then of Ucayali, which finally joins the Tangaragua to form the Amazon. The *A.* proper rises to the n.w. of the great table-land of lake Titicaca, receiving from it, however, no portion of its waters. Among the tributaries of the Amazon, it is one of the most southerly; while among them, it approaches perhaps the nearest to the Pacific. The *A.*, from its source in lat. 16° s., drains the eastern face of the Andes through about 5°, till it changes its name, as above, in 10° 45' s., meanwhile receiving several considerable affluents, more especially the Villcamayo, from the opposite quarter. The *A.* and its feeders partake of the nature rather of mountain torrents than of navigable rivers; and even for traveling by land, their rocky and rugged banks are always difficult, and often impracticable. The valleys vary in climate and productiveness according to their elevation. The upper ones yield wheat and barley, and most of the fruits of Europe; while the lower, or at least the lowest ones, abound in sugar and cotton, plantains, and pine-apples. The basin of the *A.*, as a whole, is said to be the finest part of Peru, and to contain the largest proportion of native population—the best specimens apparently of the aboriginal civilization.

AQUA (water), a compound of oxygen and hydrogen, symbol H_2O . The prefix *A.* was much used by alchemists; *A. fortis*, strong water, is nitric acid; *A. regia*, royal water, a compound usually containing one part of nitric acid with two of hydrochloric, which dissolves gold; *A. vitæ*, water of life, strong drink, or alcohol. In modern pharmacy we have *A. distilla*, *fluvialis*, *pluvialis*, *fontana*, and *marina*, or distilled, river, rain, spring, and sea water.

AQUA FORTIS, literally, *strong water*, was the term used by the alchemists to denote nitric acid, and is still the commercial name of that acid.

AQUA MARINE, a name sometimes popularly given to the beryl (q.v.). Some green and blue varieties of topaz have also been styled A.

AQUA REGINÆ, literally, *queen's water*, is a mixture of concentrated sulphuric acid (oil of vitriol) and nitric acid, or of sulphuric acid and nitre. Either mixture evolves much fumes, and may be used as a disinfectant, as similar mixtures are sold under the name of *everlasting disinfectants*.

AQUA REGIS, or **REGIA**, literally, *royal water*, is the common name applied to a mixture of 1 part of nitric acid, and 2, 3, or 4 parts of hydrochloric acid. The general proportion is 1 to 2. The term *aqua regia* (royal water) was given to the mixture from the power it possesses of dissolving gold, which is the *king of the metals*.

AQUARIANS, a Christian sect in the 3d c. who used water instead of wine at the Lord's supper. The name was given in Africa, also, to those who in times of persecution forbore to use the wine in the communion when the scent of their breath would be likely to betray them.

AQUARIUM, a tank or vessel containing either salt or fresh water, and in which either marine or fresh-water plants and animals are kept in a living state. The name was formerly sometimes given to a tank or cistern placed in a hot-house, and intended for the cultivation of aquatic plants. The A., as now in use—originally called *vivarium* or *aquarium*, and intended chiefly for animals, became extremely common about 20 years ago. From 1854 to 1860, there was a mania for these scientific toys: they became not only an aid to study, but a source of rational amusement, depending in principle upon the relations discovered by science between animal and vegetable life, and particularly upon the consumption by plants, under the action of light, of the carbonic acid gas given forth by animals, and the consequent restoration to the air or water in which they live of the oxygen necessary for the maintenance of animal life. The A. must therefore contain both plants and animals, and in something like a proper proportion. Zoophytes, annelides, mollusca, crustacea, and fishes may thus, with due care, be kept in health, and their habits observed. The water must be frequently *aerated*, which can be accomplished by taking up portions of it and pouring them in again from a small height. The fresh-water A. is frequently provided with a fountain, which produces a continual change of water; but even where this is the case, the presence both of plants and animals is advantageous to the health of both. When sea-water cannot easily be procured for the marine A., a substitute may be made by mixing with rather less than 4 quarts of spring water $3\frac{1}{2}$ ounces of common table-salt, $\frac{1}{4}$ ounce of Epsom salts, 200 grains troy of chloride of magnesium, and 40 grains troy of chloride of potassium. With care, the water may be kept good for a long time. No dead animal or decaying plant must be permitted to remain in it. Salt water, artificially prepared, is not fit for the reception of animals at once; but a few plants must first be placed in it, for which purpose some of the green algæ, species of *ulva* and *conferva*, are most suitable. The presence of a number of molluscous animals, such as the common periwinkle, is necessary for the consumption of the continually growing vegetable matter, and of the multitudinous spores (seeds), particularly of *confervæ*, which would otherwise soon fill the water, rendering it greenish or brownish, and untransparent, and which may be seen beginning to vegetate everywhere on the pebbles or on the glass of the tank. In a fresh-water A., molluscous animals of similar habits, such as species of *lymnæa* or *planorbis*, are equally indispensable. For large aquaria, tanks of plate-glass are commonly used; smaller ones are made of bottle-glass or of crystal.

Of course, the plants and animals with which the A. is stocked are various, according to taste and opportunities, or the desire to make particular kinds the subjects of careful and continued observation. Blennies, gobies, and gray mullets are perhaps the kinds of fish most commonly seen in marine aquaria; gold-fishes, sticklebacks, and minnows are frequent enough in fresh-water ones. These have the advantage of being more easily kept in good health than many other kinds, and a further recommendation is found in their small size, and in the fine colors of the gold-fish. The nests of sticklebacks are a subject of unfailing interest. Crabs of various species, and actinæ or sea-anemones, are very generally among the larger inmates of the A. Serpulæ contribute much both to its interest and beauty, as they spread out their delicate and finely tinted branchiæ from the mouth of their shelly tube, and withdraw within it, quick as thought, upon the slightest disturbance. Balani or acorn-shells are very beautiful objects when they are seen opening their summit-valves, and rapidly stretching out and retracting their little nets. Even periwinkles and limpets are interesting, particularly when they are watched by the aid of a magnifying-glass, as they feed upon the spores of the *confervæ* which have just begun to vegetate on the glass of the A., moving slowly along, with continual opening and shutting of the mouth, like cows at pasture, when the structure and motions of their mouths may be observed, and the singular beauty and brilliancy of colors never fails to command admiration. The use of a good magnifying lens adds greatly to the interest of the A., and zoophytes of exquisite forms and colors may be watched in the

actual processes of life. The feeding of fishes, crabs, sea-anemones, etc., is a source of amusement, and it is interesting even to note how the inmates of the A. occasionally feed on their fellow-prisoners.

The idea of the A. seems to have originated from Mr. Ward's invention of the *cases* which bear his name (see *WARDIAN CASES*), and in which delicate ferns and other plants grow so well even in towns; but the late Sir John Graham Dalzell began to keep living marine animals in his house in Edinburgh so early as 1790, and continued to do so till the year 1850. Mr. Warrington appears to have been the first to make experiments on its practicability, and the name of Mr. Gosse is intimately associated with its early development and introduction to popularity as a scientific plaything. A Mr. Price also conducted some very successful experiments as to the balance of animal and vegetable life in aquaria. The largest aquaria in the world are those at Brighton and Hamburg. In 1897 the old fort known as Castle Garden, and long used as a landing-place for immigrants, was turned into a public aquarium.

AQUARIUS, *The water-bearer*, the 11th sign of the zodiac, through which the sun moves in part of the months of Jan. and Feb. It is also the name of a zodiacal constellation, whose position in the heavens may be found by producing a line in a southerly direction through the stars in the head of Andromeda and the wing of Pegasus.

AQUATIC plants and animals are those that live either wholly or partly in water. The term is very vaguely used, those plants being often called A. which grow in ponds, ditches, etc., although not only their inflorescence, but great part of their foliage, is above the surface of the water, as well as those which more completely belong to that element; and a similar latitude of meaning prevails with regard to animals. Few phanerogamous (or flowering) plants exist entirely under water, although there are a few, like the common *zostera marina*, or grass-wrack, which do so, and produce even their flowers in that condition; others, of which the greater part of the plant is usually under water; produce their flowers upon, or considerably above, its surface, as those of the genera *valisneria*, *anacharis* (q.v.), etc. The leaves, as well as the flowers, of many float upon the water, of which the water-lilies furnish well-known and beautiful examples; whilst in *ranunculus aquatilis*, that exquisite ornament of our river margins, we have an instance of a kind not unfrequent, of great diversity between the lower leaves which remain submersed, and the upper leaves which float. Of cryptogamous plants, one great order, algæ, is exclusively A., and these seem adapted to perform under water all the functions of their life. A. plants are, in general, of less compact structure than is usual in other plants, and are thus lighter and better adapted for rising in their growth towards the surface of the water; in order to which also some of the algæ, as may be seen in more than one of the most common sea-weeds of our coasts, are provided with air-bladders of considerable magnitude. All this is the more necessary, as plants completely A. have generally little firmness of stem, and if their weight made them fall to the bottom, would lie in a mass, as they do when withdrawn from the water, in which, however, they gracefully float, their flexibility of stem enabling them to adapt themselves to waves or currents; which would destroy them if they were more rigid. So admirably are all things in nature harmonized.

Many animals, to a considerable extent A. in their habits, must not only breathe air, but are adapted for spending great part of their existence on dry land. Such are chiefly those that seek their food in the water. The peculiarities of structure by which they are fitted for wading, for swimming, for diving, and for remaining under water a longer time than other animals can, are very interesting and admirable. Even the fur of the beaver, the otter, the water-rat, and other animals of this description, is not liable to be drenched like that of other quadrupeds; and the plumage of water-fowls exhibits a similar peculiarity. The feet of many are webbed, so as to enable them to swim with great facility; and to this the general form, as in water-fowls, likewise exhibits a beautiful adaptation. The webbed feet in some, of which the habits are most thoroughly A., as seals, assume the character of a sort of paddle, admirably fitted for use in the water, but by means of which they can only move very awkwardly on land. The forms of whales and fishes are remarkably adapted for progression in water; whilst, instead of the limbs by which other vertebrate animals are enabled to move upon the land or to fly in the air, their great organ of locomotion is the tail, or rather the hinder part of the elongated body itself, with the tail as the blade of the great oar, which all the principal muscles of the body concur to move. Remarkable provision is made in A. animals of the higher vertebrate classes for the maintenance of the requisite animal heat, by the character of the fur or plumage; a purpose which the blubber of whales also most perfectly serves. In the colder-blooded animals, where no such provision is requisite, the structure of the heart is accommodated to the diminished necessity for oxygenation of the blood; and although reptiles in their perfect state must breathe air, many of them can remain long under water without inconvenience. Fishes, and the many other animals provided with branchiæ or gills, breathe in the water itself, deriving the necessary oxygen, which in their case is comparatively little, from the small particles of air with which it is mingled. They cannot subsist in water which has been deprived of air by boiling. Some A. insects carry down with them into the water particles of air entangled in hairs with which their bodies are abundantly furnished.

AQUATINTA, a mode of etching on copper, by which imitations of drawings in Indian ink, bistre, and sepia are produced. On a plate of copper a ground is prepared of black resin, on which the design is traced; a complicated series of manipulations with varnish and dilute acid is then gone through, until the desired result is attained. The process of A. has fallen into comparative disuse.

AQUA TOFANA, a poisonous liquid which was much talked of in the s. of Italy about the end of the 17th century. Its invention is still a matter of dubiety, but it is ascribed to a Sicilian woman named Tofana, who lived first at Palermo, but was obliged, from the attention of the authorities having been attracted to her proceedings, to take refuge in Naples. She sold the preparation in small phials, inscribed "Manna of St. Nicholas of Bari," there being a current superstition that from the tomb of that saint there flowed an oil of miraculous efficacy in many diseases. The poison was especially sought after by young wives that wished to get rid of their husbands. The number of husbands dying suddenly in Rome about the year 1659, raised suspicion, and a society of young married women was discovered, presided over by an old woman named Spara, who had learned the art of poisoning from Tofana. Spara and four other members of the society were publicly executed. Tofana continued to live to a great age in a cloister, in which she had taken refuge, but was at last (1709) dragged from it, and put to the torture, when she confessed having been instrumental to 600 deaths. According to one account she was strangled; but others affirm that she was still living in prison in 1730.

The A. T. is usually described as a clear, colorless, tasteless, and inodorous fluid; 5 or 6 drops were sufficient to produce death, which resulted slowly and without pain, inflammation, or fever; under a constant thirst, a weariness of life, and an aversion to food, the strength of the person gradually wasted away. It is even stated that the poison could be made to produce its effects in a determined time, long or short, according to the wish of the administrator—a notion generally prevalent in those ages respecting secret poisoning. The most wonderful stories are told of the mode of preparing this poison; for example, the spittle of a person driven nearly mad by continued tickling was held to be an essential ingredient. Later investigations into the real nature of the A. T. lead to the belief that it was principally a solution of arsenic.

AQUA VITÆ (Lat., water of life) is a common term applied to ardent spirits. During the alchemical epoch, brandy or distilled spirits was much used as a medicine, was considered a cure for all disorders, and even got the credit of prolonging life; and as Latin was the tongue employed in the conveyance of knowledge in those days, this restorer of health and prolonger of life was naturally christened A. V.

AQUEDUCT (Lat. *aqua ductus*), an artificial course or channel by which water is conveyed along an inclined plain. When an A. is carried across a valley, it is usually raised on arches, and where elevated ground or hills intervene, a passage is cut, or, if necessary, a tunnel bored for it. Aqueducts were not unknown to the Greeks; but there are no remains of those which they constructed, and the brief notices of them by Pausanias, Herodotus, and others, do not enable us to form any distinct notion of their character. The aqueducts of the Romans were amongst the most magnificent of their works, and the noble supply of water which modern Rome derives from the three now in use, of which two are ancient, gives the stranger a very vivid conception of the vast scale on which the ancient city must have been provided with one of the most important appliances of civilization and refinement, when nine were employed to pour water into its baths and fountains.

The following are the names of the Roman aqueducts, chronologically arranged:

1. The *Aqua Appia*, begun by and named after the censor Appius Claudius about 313 B.C. It ran a course of between 6 and 7 m., its source being in the neighborhood of Palestrina. With the exception of a small portion near the Porta Capena, it was subterranean. No remains of it exist.

2. *Anio Vetus*, constructed about 273 B.C. by M. Curius Dentatus. It also was chiefly underground. Remains may be traced both at Tivoli and near the Porta Maggiore. From the point at which it quitted the river Anio, about 20 m. above Tivoli, to Rome, is about 43 miles.

3. *Aqua Marcia*, named after the prætor Quintus Marcius Rex, 145 B.C., had its source between Tivoli and Subiaco, and was consequently about 60 m. long. The noble arches which stretch across the Campagna for some 6 m. on the road to Frascati, are the portion of this A. which was above ground.

4. *Aqua Tepula* (126 B.C.) had its source near Tusculum, and its channel was carried over the arches of the last-mentioned A.

5. *Aqua Julia*, constructed by Agrippa, and named after Augustus 34 B.C. Like the Tepulan, it was carried along the Marcian arches, and its source was also near Tusculum. Remains of the three last-mentioned aqueducts still exist.

6. *Aqua Virgo*, also constructed by Agrippa, and said to have been named in consequence of the spring which supplied it having been pointed out by a girl to some of Agrippa's soldiers when in search of water. The Aqua Vergine, as it is now called, is still entire, having been restored by the popes Nicholas V. and Pius IV. 1568. The source of the Aqua Virgo is near the Anio, in the neighborhood of Torre Salona, on the Via Collatina, and about 14 m. from Rome. The original object of this A. was to sup-

ply the baths of Agrippa; its water now flows in the Fontana Trevi, that of the Piazza Navona, the Piazza Farnese, and the Barcaccia of the Piazza di Spagna. The water of the Aqua Virgo is the best in Rome.

7. *Aqua Alsietina*, constructed by Augustus, and afterwards restored by Trajan, and latterly by the popes. This A., now called the Aqua Paola, is situated on the right bank of the Tiber, and supplies the fountains in front of St. Peter's and the Fontana Paola on the Montorio. Its original object was to supply the Naumachia of Augustus, which was a sheet of water for the representation of sea-fights.

8. *Aqua Claudia*, commenced by Caligula and completed by Claudius, 51 A.D. A line of magnificent arches which formerly belonged to this A. still stretches across the Campagna, and forms one of the grandest of Roman ruins. It was used as a quarry by Sextus V. for the construction of the Aqua Felici, which now supplies the fountain of Termini, and various others in different parts of the city.

9. *Anio Novus*, which was the most copious of all the Roman fountains, though inferior to the Marcia in the solidity of its structure; it was also the longest of the aqueducts, pursuing a course of no less than 62 miles. By the two last-mentioned aqueducts, the former supply of water was doubled. In addition to the aqueducts already mentioned, there was the Aqua Trajana, which may, however, be regarded as a branch of the Anio Novus, and several others of later construction, such as the Antoniana, Alexandrina, and Jovia, all inferior to the older ones in extent and magnificence.

Nor was it for the uses of the capital alone that aqueducts were constructed. The A. of Trajan, at Civita Vecchia, which conveys the water a distance of 23 m., and that in the vicinity of Marzana, near Verona, with others that might be mentioned, still attest the existence of aqueducts in the smaller towns of Italy in Roman times. Even during the unpromising period which succeeded, the habit of their construction was not abandoned, that of Spoleto having been built by the Lombard duke Theodolapius in 604. The extraordinary A. by which the fountain at Siena is supplied, is said to have occupied two centuries in building; and the modern A. of Leghorn, which is not unworthy of the Roman models after which it was designed, is surpassed in magnificence by that of Pisa, with its thousand arches. In the more distant provinces which fell under the Roman power, aqueducts were likewise constructed—at Nicomedia, Ephesus, Smyrna, Alexandria, Syracuse, and in many of the towns in Gaul and in Spain. At Merida there are the remains of two aqueducts, of one of which there are 37 piers still standing, with three tiers of arches. But the most magnificent structure of this class in Spain is the A. of Segovia, in Old Castile, for which Spanish writers claim an antiquity beyond that of the Roman dominion; but which, there is reason to believe, belongs to the time of Trajan. At Evora, in Portugal, there is likewise an A. in good preservation, with a *castellum* or reservoir at its termination in the city, consisting of two stories, the lower one being decorated with pillars. But of all the provincial aqueducts, that at Nîmes, in Provence, is at once the most remarkable and the best preserved. The following description of it, which we transcribe from Mr. Murray's excellent hand-book for France, will convey to the reader a very vivid conception not only of this A. in particular, but of the very interesting class of works to which it belongs. "It consists of three rows of arches, raised one above the other, each smaller than the one below it; the lowest of 6 arches, the center tier of 11, and the uppermost of 35; the whole in a simple if not a stern style of architecture, destitute of ornament. It is by its magnitude, and the skillful fitting of its enormous blocks, that it makes an impression on the mind. It is the more striking from the utter solitude in which it stands—a rocky valley, partly covered with brushwood and greensward, with scarce a human habitation in sight, only a few goats browsing. After the lapse of 16 c., this colossal monument still spans the valley, joining hill to hill, in a nearly perfect state, only the upper part, at the northern extremity, being broken away. The highest range of arches carries a small canal, about 4½ ft. high and 4 ft. wide, just large enough for a man to creep through, still retaining a thick lining of Roman cement. It is covered with stone slabs, along which it is possible to walk from one end to the other, and to overlook the valley of the Gardon. The height of the Pont du Gard is 188 ft., and the length of the highest arcade 873 feet. Its use was to convey to the town of Nîmes the water of two springs, 25 m. distant. . . . The conveyance of this small stream was the sole object and use of this gigantic structure, an end which would now be attained by a few iron water-pipes." Neither the date nor the builder of the Pont du Gard is known with certainty, but it is ascribed to Agrippa, the nephew of Augustus; a conjecture which is rendered probable by the fact of his having restored the Appian, Marcan, and Anienian, and constructed the Julian A. at Rome. The importance which the Romans attached to their aqueducts may be gathered from the fact, that special officers, invested with considerable authority, and, like all the higher officials, attended by lictors and public slaves, were appointed for their superintendence. Under the orders of these "guardians of the waters," we are told that, in the time of Nerva and Trajan, about 700 architects and others were employed in attending to the A. These officials were divided into various classes, and known by different names, according as their duties related to the care of the course of the A. the *castella* or reservoirs at its termini, the pavement of the channel, the cement with which it was covered, and the like. For representations of ancient A., see illus., *ENGINEERING*, vol. V.; *WATER STORAGE*, vol. XV.

The construction of aqueducts in recent times is comparatively rare, water being now generally conveyed in pipes; but several instances are worthy of notice. The *Lisbon A.*, completed in 1738, is about 3 leagues in length; near the city, it is carried over a deep valley for a length of 2400 ft. by a number of bold arches, the largest of which has a height of 250 ft., and a span of 115. London has its New River A.; Glasgow, one from loch Katrine; Paris, the canal de l'Ourcq, and the A. of the Vanne; Marseilles, that of Roquefavour; and Vienna, an A. 59 m. long, capable of supplying 24,000,000 gallons daily. The springs supplying it are at an altitude of nearly 1000 ft. In the United States, New York, Boston, Brooklyn, Chicago, and very many other cities and villages have A. for supplying water. The most expensive and costly is the Croton A. for supplying New York, completed in 1842 at a cost of about \$12,500,000. This A. is 50 m. long, and is carried through 16 tunnels, which have a total length of a mile and a quarter, over some short viaducts, and over the Harlem river on a stone bridge, 1460 ft. long and 116 ft. above high water, with 8 arches of 80 ft. and 7 of 50 ft. span. From the dam in the Croton river to the Harlem river, the A. is of stone, brick, and cement, arched over and under, in shape something like an egg, slightly depressed at either end. The height is 8½ ft., and the width an inch less than 7½ ft. The Croton water-shed is capable of delivering, even in drought, 250,000,000 gallons per day. Even this supply is inadequate, and another aqueduct was completed in 1890, at a cost of about \$2,000,000. Its length to the Harlem river is some 28½ m., and of this distance, all but about 8000 ft. is through solid rock. 320,000,000 gallons per day can be delivered by this means. The Boston A. is 14½ m. long, and is chiefly a brick structure. Washington is supplied by an A. 16 m. long, of brick and rubble stone in cement, circular in shape, 9 ft. in diameter, subterranean for the most of its course. The water is brought from Great Falls on the Potomac. Of the four bridges under the conduit, the Cabin John bridge or Union arch, a granite structure, has a span of 220 ft. A dam across Little Falls branch forms a receiving reservoir, fifty-six acres in area. The distributing reservoir, two miles distant, covers 40 acres, and can supply 70,000,000 galls. daily. Many aqueducts or mining ditches, as they are called, are used in California; though these are less substantial in construction, sheet-iron pipes and wooden troughs supported on trestles being largely employed.

AQUEOUS HUMOR is the fluid which occupies the space in the eye between the back of the cornea and the front of the lens, which, in foetal life, is divided into an *anterior* and *posterior* chamber by the *membrana pupillaris* (q.v.), and in adult life by the iris. It consists of water, with, according to Berzelius, about a fiftieth of its weight made up of chloride of sodium and extractive matters held in solution.

Anatomists are not agreed as to the spring of this watery secretion, and are inclined to doubt the existence of a special secreting membrane, which used to be taken for granted. However, a layer of delicate epithelial cells, which exists at the back of the cornea (q.v.), is probably concerned in its formation. It is rapidly resecreted if allowed to escape by any wound in the cornea, and in some cases is formed in such quantity as to cause dropsy of the eye (*hydrophthalmia*).

AQUEOUS ROCKS. In geology, every layer which forms a portion of the solid crust of the earth is called a rock, it matters not whether its particles are incoherent, like soil or sand, or compacted together, like limestone and sandstone—to all alike, irrespective of popular usage, the geologist applies the term *rock*. In this wide sense, the rocks of the earth's crust are either igneous (q.v.) or sedimentary. These sedimentary rocks have an aqueous origin, with the exception of a very limited number, like drift-sand, which are brought into their present position by the action of the wind. Unlike the igneous rocks, whose particles have assumed their present form in the position they occupy, the materials of the A. R. have evidently been brought from a distance. They owe their origin to some older rock, whose decomposition or destruction has afforded the materials. The parent rock can often be identified. Its distance is indicated by the condition of the materials, whether they are rounded and water-worn, or angular and shingly.

The agents now at work, and which have been active in past geological ages, rubbing down and transporting the materials from which these rocks are formed, are the following: 1. *The sea*, destroying the rocks and cliffs, and beaches which form its boundary, and carrying off the eroded materials to form new rocks below the level of the sea. 2. *Rivers*, including the action of their smallest tributary rills, and even of the drops of rain, for these abrade and carry off the almost imperceptible particles from the surface where they fall; and when united they form the rill with its suspended sediment, and these again unite to form the river, which in its course not only retains what it has got, but scoops up more from its own bed, and carries all to the sea or lake, to deposit it there as a new stratum. It is difficult to estimate the influence of this agency. Sir Charles Lyell calculates that the Nile annually deposits in the Mediterranean 3,702,758,400 cubic feet of solid matter. 3. *Glaciers and icebergs*. These enormous moving masses of ice are not only loaded with rock-fragments, which are deposited as the ice melts, but are ever abrading the rocks over which they pass, and thus supply materials to form new layers. 4. Several stratified rocks have an evidently *organic origin*, such as chalk, and some limestones chiefly composed of animal remains, and coal consisting of vegetable carbon; but even these have been influenced in their formation by water so much as to justify us in classifying them with A. R. 5. The same remark applies to rocks which

have been *precipitated from a fluid* with which the materials existed in chemical combination, as has been the case with beds of salt, gypsum, and calcareous tufa.

As the result of these various actions, we have a series of rocks which, from their composition, may be classed as arenaceous, argillaceous, calcareous, carbonaceous, saline, and silicious. We must refer to these terms for the descriptions of the various rocks included under them.

The arrangement of the A. R. depending on their different ages, is of more importance in modern geology than that depending on their internal constitution. When a section of the earth's crust is examined, it is found to be composed of a series of layers which have been produced in succession. Comparing this with sections in other districts, it is noticed that there is a regularity in the several parts; for beds of the same structure are found in different localities, and these occupy the same relative position to the adjacent beds. A number of observations have shown that the crust of the earth is composed of a *regular series of earthy deposits* formed one after another, during successive periods of time. This general induction forms the basis of the following classification. For the description of the included strata we must again refer to the names of the different divisions:

I. TERTIARY OR KAINOZOIC EPOCH—1. Superficial deposits of recent period; 2. Pleistocene period; 3. Pliocene or upper tertiary period; 4. Miocene or middle tertiary period; 5. Eocene or lower tertiary period.

II. SECONDARY OR MESOZOIC EPOCH—6. Cretaceous period; 7. Oolitic period; 8. Triassic period.

III. PRIMARY OR PALÆOZOIC EPOCH—9. Permian period; 10. Carboniferous period; 11. Devonian or old red sandstone period; 12. Silurian period; 13. Cambrian period.

AQUIFOLIA CÆ, a natural order of dicotyledonous or exogenous plants, of which the common holly (q. v.) is the best known example, and the only species that is a native of Europe. The order, however, contains more than one hundred species, the greater part of which are natives of America, and many of them belong to the tropical and sub-tropical parts of it. The species are all evergreen trees or shrubs, with simple, leathery leaves, and without stipules. The flowers are small and axillary, with 4 to 6 sepals, and a 4 to 6-parted corolla, into which the stamens are inserted, alternating with its segments. The ovary is fleshy and superior, with two or more cells, a solitary anatropal pendulous ovule in each cell, the cells generally becoming bony as distinct *stones* in the fruit, which is fleshy. The order is allied to *rhamnaceæ*, *elastraceæ*, and *ebenaceæ*. The most interesting species belong to the genus *ilex*, or holly (q. v.).

AQUILA. See EAGLE.

AQUILA, or **AQUILA DEGLI ABRUZZI**, the capital of the Italian province of the same name, is situated on the Pescara, near the loftiest of the Apennines. Pop. 1893, 20,800. It is a fortified city and the seat of a bishop. A. was built by the emperor Frederick II. from the ruins of the ancient *Amitemum*, a t. of the Sabines, and the birth-place of Sallust the historian. In 1703 it was almost destroyed by an earthquake, in which 2000 persons perished. A. is a bishop's see, has civil and criminal courts, and a lyceum, and is considered one of the best built towns in the kingdom. In 1841, much political disturbance took place here, and several of the inhabitants were imprisoned and executed in consequence. The province of A. is one of the most picturesque districts of Italy.

AQUILA, CASPAR (the Latin name of Kaspar Adler), 1488-1560; a German theologian. He studied law in Augsburg, Germany, and in Italy, and was appointed pastor of Jenga. He embraced Luther's doctrines, for which he was kept in prison during the winter of 1519-20, but he was set free through the influence of Isabella, queen of Denmark. At Wittenberg he met Luther, whom he assisted in the translation of the Old Testament, having been appointed professor of Hebrew at W. In 1528, he became bishop of Saalfeld, but his vehement opposition to the interim of Charles V. in 1548, compelled him to fly for asylum to the countess of Schwarzburg. In 1550, he was given the deanery of Schmalkalden, and two years later was restored as bishop of Saalfeld, filling the office until his death. He left a number of controversial works and many sermons.

AQUILA, PONTICUS, a celebrated translator of the Old Testament into Greek, b. at Sinope. He flourished about the year 180 A.D., is said to have been a relation of the emperor Hadrian, and to have been first a pagan, then a Christian, and finally a Jew; submitting in his last conversion to the peculiar religious ceremony of circumcision. His translation of the Old Testament—which appears to have been undertaken for the benefit of his Hellenized countrymen—was so *literal*, that the Jews preferred it to the Septuagint, as did also the Judaizing sect of Christians, called Ebionites. Only a portion of the work remains, which has been edited by Montfaucon and others.

AQUILARIA CÆ, a natural order of dicotyledonous or exogenous plants, containing only about ten known species, all of which are trees with smooth branches and tough bark, natives of the tropical parts of Asia. The leaves are entire; the perianth leathery, turbinate, or tubular, its limb divided into four or five segments; the stamens usually ten; the filaments inserted into the orifice of the perianth; the ovary two-celled, with

two ovules; the stigma large; the fruit a 2-valved capsule, or a drupe. The order is chiefly interesting as producing the fragrant wood called aloes wood (q.v.).

AQUILEGIA. See COLUMBINE.

AQUILEJA, or **AGLAR** (earlier, *Velia* or *Aquila*), is a small t. in Austria, at the head of the Adriatic, 22 m. w.n.w. of Trieste. Pop. about 2000. It is now sunk in utter insignificance, possessing no trade or public buildings of any note, except its cathedral; but in the time of the Roman emperors, it was one of the most important places n. of the metropolis. Its commerce was flourishing, for though 8 m. distant from the sea, vessels could reach it by canals connecting it with the rivers in its vicinity. It was both the central point of the transit-trade between the north and south of Europe, and the key of Italy against the barbarians. Founded by a Roman colony in 181 B.C., it became a favorite residence of Augustus; and in 168 A.D. was so strongly fortified by Marcus Aurelius, as to be considered the first bulwark of the empire on the n. It was called *Roma secunda*, the second Rome. Here the emperor Maximin perished; and in the vicinity Constantius lost his life in a battle against his brother Constans. When the t. was destroyed by Attila (452), it had 100,000 inhabitants. It never recovered, although it received some ecclesiastical honors, but has continued slowly dwindling down into deeper obscurity and wretchedness. There are numerous remains of its former splendor. Councils were held at A. in 381, 558, 698, and 1184 A.D.

AQUINAS, **THOMAS**, or **THOMAS OF AQUINO**, one of the most influential of the scholastic theologians, was of the family of the counts of Aquino, in the kingdom of Naples, and was b. in the castle of Rocca Secca about 1227. He received the rudiments of his education from the Benedictine monks at Monte-Casino, and completed his studies at the university of Naples. A strong inclination to philosophical speculation determined the young nobleman, against the will of his family, to enter (1243) the order of Dominicans. In order to frustrate the attempts of his friends to remove him from the convent, he was sent away from Naples, with the view of going to France; but his brothers took him by force from his conductors, and carried him to the paternal castle. Here he was guarded as a prisoner for two years, when, by the help of the Dominicans, he contrived to escape, and went through France to the Dominican convent at Cologne, in order to enjoy the instructions of the famous Albertus Magnus (q.v.). According to another account, he owed his release from confinement to the interference of the emperor and the pope. At Cologne he pursued his studies in such silence, that his companions gave him the name of the "dumb ox." But Albert, his master, is reported to have predicted, "that this ox would one day fill the world with his bellowing." Thoroughly imbued with the scholastic, dialectic, and Aristotelian philosophy, he came forward, after a few years, as a public teacher in Paris. His masterly application of this philosophy to the systematizing of theology, soon procured him a distinguished reputation. It was not, however, till 1257 that A. obtained the degree of doctor, as the university of the Sorbonne was hostile to the mendicant monks. He vindicated his order in his work, *Contra Impugnantes Dei Cultum et Religionem*; and, in a disputation in presence of the pope, procured the condemnation of the books of his adversaries. He continued the lecture with great applause in Paris, till Urban IV., in 1261, called him to Italy to teach philosophy in Rome, Bologna, and Pisa. Finally he came to reside in the convent at Naples, where he declined the offer of the dignity of archbishop, in order to devote himself entirely to study and lecturing. Being summoned by Gregory X. to attend the general council at Lyon, he was surprised by death on the way, 1274, at Fossanuova, in Naples. According to a report, he was poisoned at the instigation of Charles I. of Sicily, who dreaded the evidence that A. would give of him at Lyon.

Even during his life A. enjoyed the highest consideration in the church. His voice carried decisive weight with it; and his scholars called him the "universal," the "angelic doctor," and the "second Augustine." A general chapter of Dominicans in Paris made it obligatory on the members of the order, under pain of punishment, to defend his doctrines. It was chiefly the narratives of miracles said to have been wrought by A. that induced John XXII., in 1323, to give him a place among the saints. His remains were deposited in the convent of his order at Toulouse. Like most of the other scholastic theologians, he had no knowledge of Greek or Hebrew, and was almost equally ignorant of history; but his writings display a great expenditure of diligence and dialectic art, set off with the irresistible eloquence of zeal. His chief works are—a *Commentary on the Four Books of Sentences of Peter Lombard*, the *Summa Theologiae*, *Quæstiones Disputatæ et Quodlibetales*, and *Opuscula Theologica*. He gave a new and scientific foundation to the doctrine of the church's treasury of works of supererogation, to that of withholding the cup from the laity in the communion, and to transubstantiation. He also treated Christian morals according to an arrangement of his own, and with a comprehensiveness that procured him the title of the "father of moral philosophy." The definiteness, clearness, and completeness of his method of handling the theology of the church, gave his works a superiority over the text-books of the earlier writers on systematic theology. His *Summa Theologiae* is the first attempt at a complete theological system. Accordingly, Pius V., to whom we owe the publication of the complete collection of A.'s works (18 vols., Rome, 1570; a newer but less trustworthy ed., 23 vols.,

Paris, 1636-41), ranks him with the greatest teachers of the church. In his philosophical writings, the ablest of which is his *Summa Fidei Catholice contra Gentiles*, he throws new light over the most abstract truths. The circumstances of A. being a Dominican, and boasted of by his order as their great ornament, excited the jealousy of the Franciscans against him. In the beginning of the 14th c., Duns Scotus (q.v.), a Franciscan, came forward as the declared opponent of the doctrines of A., and founded the philosophico-theological school of the Scotists, to whom the Thomists, mostly Dominicans, stood opposed. The Thomists leaned in philosophy to nominalism (q.v.), although they held the abstract form to be the essence of things; they followed the doctrines of Augustine as to grace, and disputed the immaculate conception of the Virgin. The Scotists, again, inclined to realism and to the views of the Semipelagians, and upheld the immaculate conception.

AQUITA'NIA, the Latin name of a part of Gaul, originally including the country between the Pyrenees and the Garonne, peopled by Iberian tribes. Augustus, when he divided Gaul into four provinces, added to A. the country lying between the rivers Garonne and Loire. Afterwards, A. passed into the hands—first, of the West Goths, and then of the Franks; and during the Merovingian dynasty, became an independent duchy. Though subjugated by Charlemagne, the duchy again claimed independence under the weak monarchs of the Carolingian dynasty. In 1137, it was united to the crown of France by the marriage of Louis VII. with Eleanor, heiress of A. In 1152, A. became an English possession through the marriage of Henry II. with Eleanor, whom Louis had divorced, and a long series of disputes took place between England and France respecting A., which was at length ultimately united to the crown of France by Charles VII. in 1451.

ARABESQUE (Fr.), means merely *after the Arabian manner*; and, so far as etymology is concerned, might therefore be general in its application. In practice, however, it is used to characterize a peculiar kind of fantastic decoration commonly employed in conjunction with architecture, and which the Spanish Moors are supposed to have introduced into modern Europe. But the species of enrichment to which this term is now applied, was extensively employed both by the Greeks and Romans, the latter in particular being masters of the style. The Egyptians, from whom the Moors probably derived their original notions of this and other forms of art, also employed it in enriching their monumental decorations. But the A. of the Moors differed from that of the Egyptians in entirely excluding the figures of animals, the representation of which was forbidden by the Mohammedan religion, and confining itself entirely to the foliage, flowers, fruit, and tendrils of plants and trees, curiously and elaborately intertwined. This limitation of the field of A. was again departed from when the decorations were discovered on the walls of the baths of Titus, in the time of Leo X.; and more recently those in the houses at Herculaneum and Pompeii came to form the models of imitation, and the modern A. consists usually of combinations of plants, birds, and animals of all kinds, including the human figure, and embracing not only every natural variety, but stepping without hesitation beyond the bounds of nature. The freedom with which it admits the fantastic is, indeed, the leading peculiarity of A.; and as it is found in some form amongst every people who have attempted to give a visible representation of their fancies, it is spoken of by F. Schlegel as "the oldest and original form of fancy." The arabesques with which Raphael adorned the galleries of the Vatican, and which he is said to have imitated from those which he had been instrumental in discovering in the baths of Titus, are at once the most famous and the most beautiful which the modern world has produced. Arabesques are usually painted, though the term is also applied to sculptural representations of similar subjects in low relief.

ARABI PASHA, AHMED, was born about 1837, of Fellah parents, in Charkieh, Lower Egypt. He entered the army at an early age; later, became an intimate friend of Ali Pasha (q.v.), and as early as 1876 began to incite the people to discontent. Even before he was made Minister of War he acquired great influence in all parts of the public administration, and was the head of the National party during the uprising against the English in 1881. After their final defeat at Tel-el-Kebir in Sept., he surrendered, pleaded guilty to the charge of rebellion, and was sentenced to death, but this sentence was finally commuted to exile on the island of Ceylon. See EGYPT.

ARABIA—called by the inhabitants, Jezirat-al-Arab (the peninsula of A.); by the Turks and Persians, Arabistân—is the great south-western peninsula of Asia, and is situated 12° 40' to 34° n. lat., and 32° 30' to 60° e. long. Its length from n. to s. is about 1500 m.; its breadth, about 800; its area, 1,230,000 sq. m.; and its pop. is roughly estimated at 6,000,000. It is bounded on the n. by Asiatic Turkey; on the e., by the Persian gulf and the gulf of Oman; on the s., by the gulf of Oman and the Indian ocean; and on the w., by the Red sea. It is connected with Africa on the n.w. by the isthmus of Suez. Through the center of the land, between Mecca and Medina, runs the tropic of Cancer. The name A. has been derived by some from *Araba* (which means a level waste), a district in the province of Tehama; by others, from *Eber*, a word signifying a nomad ("wanderer"), as the primitive Arabs were such. This would connect it with the word Hebrew, which has a similar origin. Others, again, are inclined to derive it from the Hebrew verb *Arab*, to go down—that is, the region in which the sun appeared to set to the Semitic dwellers on the Euphrates. There is also a Hebrew word, Arâbah, which means "a barren place," and which is occasionally employed in Scripture to denote the

border-land between Syria and Arabia. Ptolemy is supposed to be the author of the famous threefold division into *Arabia Petraea*, *Arabia Felix*, and *Arabia Deserta*—the first of which included the whole of the n.w. portion; the second, the w. and s.w. coasts; and the third, the whole of the dimly known interior. This division, however, is not recognized by the natives themselves, neither is it very accurate as at present understood, for *Petraea* was not intended to mean rocky or stony. Ptolemy formed the adjective from the flourishing city of Petra (the capital of the kingdom of the Nabathaeans), whose proper name was *Thamud*—that is, the rock with a single stream. The word *Felix*, also, arose from an incorrect translation of Yemen, which does not signify “happy,” but the land lying to the right of Mecca—as *Al-Shan* (Syria) means the land lying to the left of the same. The divisions of the Arab geographers are as follows—1. *Bahr-el-Tour Sinai* (Desert of Mount Sinai); 2. The *Hedjaz* (Land of Pilgrimage); 3. *Tehama* and *Yemen*, along the Red sea; 4. *Hadramaut*, the region along the southern coast; 5. *Oman*, the kingdom of Muscat; 6. *Bahrain*, on the Persian gulf; 7. *Nedjed*, the central highlands of Arabia.

Our knowledge of the interior of A. is still very imperfect in detail, but its general characteristics are decidedly African. The largest portion of it lies in that great desert zone which stretches from the shores of the Atlantic to those of the northern Pacific. The interior, so far as it has yet been explored by Europeans, seems to be a great plateau, in some places reaching a height of 8000 feet. The western border crest of this plateau may be regarded as part of a mountain-chain, beginning in the n. with Lebanon, and stretching s. to the straits of Bab-el-Mandeb. From Bab-el-Mandeb another chain runs n.e., parallel to the coast, to Oman. From the mountain-range on the w. the plateau slopes to the n.e., and forms, in general, a vast tract of shifting sands, interspersed here and there about the center with various ranges of hills, which, like the shores of the peninsula, are generally barren and uninteresting.

A. has, on the whole, an African climate. Though surrounded on three sides by the sea, its chains of hills exclude in a great measure the modifying influence of currents of air from the ocean. In several parts of A. hardly a refreshing shower falls in the course of the year, and vegetation is almost unknown: in other sultry districts, the date-palm is almost the only proof of vegetable life. Over large sterile tracts hangs a sky of almost eternal serenity. The short rainy season which occurs on the w. coast, during our summer months, fills periodically the *wadis* (hollow places) with water, while slight frosts mark the winters in the center and north-east. During the hot season, the simoom (q. v.) blows, but only in the northern part of the land. The terraced districts are more favorable to culture, and produce wheat, barley, millet, palms, tobacco, indigo, cotton, sugar, tamarinds, excellent coffee, and many aromatic and spice-plants, as balsam, aloe, myrrh, frankincense, etc. A. is destitute of forests, but has vast stretches of desert grass fragrant with aromatic herbs, and furnishing admirable pasturage for the splendid breed of horses. Coffee, one of the most important exports, is an indigenous product both of A. and Africa.

In the animal kingdom, an African character prevails generally. Sheep, goats, and oxen satisfy the immediate domestic and personal necessities of the inhabitants, to whom the camel and horse are trusty companions in their far wanderings. Gazelles and ostriches frequent the oases of the deserts, where the lion, panther, hyena, and jackal hunt their prey. Monkeys, pheasants, and doves are found in the fertile districts, where flights of locusts often make sad devastation. Fish and turtle abound on the coast. The noble breed of Arabian horses has been cultivated for several thousand years; but the most characteristic of all animals in the peninsula is the camel, which has been both poetically and justly styled “the ship of the desert.” It may be regarded as an Arabian animal, for it seems to be proved that it is not a native of Africa, but has migrated from the peninsula with its master. The camel is not found among the figures of animals in the ancient Egyptian paintings on walls, nor does it appear to have been known to the Carthaginians. The breed of Oman is celebrated for its beauty and swiftness. Among the minerals of A. may be mentioned iron, copper, lead, coal, basalt, and asphaltum, and the precious stones emerald, carnelian, agate, and onyx. Pearls are found in the Persian gulf.

But the most interesting features of the peninsula are found in its ancient and peculiar population. The Arab is of medium stature, muscular make, and brown complexion. Earnestness and lofty pride look out of his glowing eyes; by nature he is quick, sharp-witted, lively, and passionately fond of poetry. Courage, temperance, hospitality, and good faith are his leading virtues; but these are often marred by a spirit of sanguinary revenge and rapacity. His wife keeps the house and educates the children. The Arab cannot conceive a higher felicity than the birth of a camel or a foal, or that his verses should be honored with the applause of his tribe.

Arabian life is either *nomadic* or *settled*. The wandering tribes, or Bedouins, are well known to entertain very loose notions of the rights of property. The located tribes, styled Hadesi and Fellahs, are despised by the Bedouin, who scorns to be tied down to the soil, even where such bondage might make him wealthy. As Ritter in his *Com. parative Geography* observes—Arabia “is the anti-industrial central point in the world;” for on every side, branching out to the e. or w., we find industry making progress, while here centuries pass away without any improvement save what has been introduced, almost compulsorily, by foreigners. The trade carried on by exports of coffee, dates,

figs, spices, and drugs, though still considerable, is said to be only a shadow of the old commerce which existed before the circumnavigation of Africa, or when Aden was in its prime and the Red sea was the great commercial route. A. has few manufactures, but carries on a transit-trade in foreign fabrics, besides importing these to some extent for its own necessities. Few nations have approached so near as the Arabs to the condition of standing still in a moral and social point of view. Considering how little progress has been made, it is remarkable that a greater degeneracy has not taken place. Even in the desert the children are taught to read, write, and calculate; and in the towns, education to a certain degree is general. The division of the people into so many tribes is a barrier to everything like a great national improvement; indeed, the word national can hardly be properly applied to the Arabs. It would require a series of extraordinary events to develop afresh that terrible unity which Mohammed gave A. for a time. The government is patriarchal, and the chief men of the various tribes have the title of emir, sheik, or imaum. Their function appears limited to leading the troops in the time of war, to levying tribute, and to the administration of justice. A spirit of liberty in the people moderates the authority of their chieftains; but instances of extreme despotism have not been unfrequent both in early and modern times.

To number all the distinct states of A. would be impossible in the present state of our knowledge; but the seven great divisions are those which we have enumerated. Of these the most important at present is Nedjed, a state which, while under Wahabite fanaticism it rose rapidly into leading power, and seemed for a time to wane, yet since 1849 has asserted its pre-eminence in central Arabia, and brought even Oman under its influence. See WAHABIS. Yemen possesses two very important commercial towns, Mocha and Loheia, situated on the coast of the Red sea; Oman has made considerable advances in civilization. It forms to some extent an exception to the general lack of manufacturing activity exhibited by the Arabians, having manufactures of silk and cotton turbans, sashes, canvas, arms, gunpowder, etc. The imaum of Muscat formerly claimed authority over the whole of Oman, the islands in the Persian gulf, a portion of the Persian coast, and a vast extent of territory on the e. coast of Africa, including some valuable islands. See MUSCAT and ZANZIBAR. Rostak is another large t. inland from Muscat. The district or division of Hedjaz contains the holy cities of Mecca and Medina, with their seaports, Jiddah (q.v.) and Yembo.

The history of Arabia, before the time of Mohammed, is involved in mystery, and has little interest, on account of its want of connection with the world's general progress. The aborigines of A. were probably Cushites, most of whom, on account of the hostile immigration of certain Semitic races, descended from Joktan, grandson of Shem, passed over into Abyssinia. A few, however, remained, who inhabited the western coasts. Subsequently, another Semitic race, descended from Abraham, settled in the land. The oldest Arabian tribes are now extinct, and only a traditional memory even of their names exists; but the Semitic chiefs, Joktan or Kahtan, and Ishmael, are generally considered to be the fathers of the present inhabitants. The descendants of the former are the pure Arabs; those of the latter are held to be only Arabized. The princes of A. belong wholly to the first. A great-grandson of Joktan, Himzar or Homeir, inaugurated a dynasty—the Himyarides or Homeritæ—which ruled in Yemen for upwards of 2000 years. This was a prosperous time. The Arabs of Yemen, and partly those of the desert, dwelt in towns and cultivated the soil; carried on commerce with the East Indies, Persia, Syria, and Abyssinia, in the last of which countries they planted numerous colonies. The rest of the people, however, lived nomadically, as now. Bravely, for thousands of years, they maintained their freedom, their faith, and their peculiar customs against the assaults of the great military empires. Neither the Babylonian and Assyrian nor the Egyptian and Persian kings could reduce the Arabs to a state of subjugation. Alexander had determined to try his power against A., when death interrupted his plans. Three centuries after Alexander's death, the Romans had extended their empire to the borders of A., and Trajan, in 107 A.D., penetrated far into the interior; but though the northern chieftains were brought into a formal subjection to the empire, A. was not made a Roman province. The old Himyarides in Yemen stoutly maintained their independence, and an expedition against them in the time of Augustus completely failed. With the decay of the Roman empire, strife and lawlessness increased. The Arab races continued in a scattered, disorganized condition, and many hundreds of years passed away in intestine wars, during which the central highland region was the scene of those feuds of the Arab clans so copiously sung by the native poets. Christianity found an early entrance into A. The Jews, in considerable numbers, migrated into A. after the destruction of Jerusalem, and made many proselytes, especially in Yemen. This diversity of creeds in the peninsula was favorable to the introduction of the doctrine of Mohammed, which forms the grand epoch in Arabian history, and brings it into close connection with the general history of civilization. Now, for the first time, the people of A. became united, and powerful enough to erect new empires in the three quarters of the world. The dominion of the Arabs, from the time of Mohammed to the fall of the caliphate of Bagdad in 1258, or even to the expulsion of the Moors from Spain in 1492, is an important period in the history of civilization. See the articles MOORS, CALIPHS. But the movements which had such great effects on the destinies of other nations, produced but little change in the interior of A.; and, after

the brilliant career of conquest was ended, the peninsula was left in an exhausted condition. Then followed the subjugation of Yemen by the Turks in the sixteenth century; their expulsion in the seventeenth century; the dominion of the Portuguese over Muscat, 1508-1659; the conquests of Oman and the temporary victories gained by the Persians at the close of the 16th c.; and, lastly, the appearance of the Wahabias (q.v.), 1770, whose moral influence is still felt. The latter took an important part in the political affairs of A., but their progress was interrupted by Mehemet Ali, the pasha of Egypt, who subjugated the coast-country of Hedjaz, with some parts of the coast of Yemen, and in 1818 gained a decisive advantage through the victory of Ibrahim Pasha. He was, however, forced in 1840 to resign all these claims. Politically, Hedjaz, Yemen and El Hasa are Turkish provinces; England possesses Aden; the Sinaitic Peninsula is under Egyptian rule; while Nedj is practically independent, though paying a small tribute to the Sherif of Mecca. See WAHABIS.

ARABIAN ARCHITECTURE. So inseparable is the connection between architecture and religion, that it may be stated as a general rule that no sooner is a new religion engendered than it finds expression in new architectural forms. Of this we have an interesting instance in the simultaneous rise of Mohammedanism, and of the style of architecture commonly called Arabian or Moorish, but to which the name of Mohammedan might far more appropriately be given, seeing that it has everywhere followed the religion of the crescent, and that the Arabians previously had no architecture peculiar to themselves. It is further remarkable that the style of which we speak seems to have arisen, as it were, undesignedly, or, at all events, without any conscious effort on the part of the people amongst whom it first appeared. The followers of the prophet contemplated nothing peculiar in their ecclesiastical structures; and at first their mosques were built by Christian architects from Constantinople. As a natural consequence, they resembled Byzantine churches, modified in the countries of which the Moors successively possessed themselves by the features of the existing churches. Gradually the new and fanciful ornamentation known as arabesque (q.v.) was added to the recognized features of Greek and Roman edifices. The exclusion of animal figures, which their abhorrence of the very appearance of idolatry necessitated, confined the Mohammedan artists to the imitation of vegetable productions, varied by geometrical patterns and inscriptions, of which the letters were woven into forms which suited them for architectural uses. But the most original feature in their edifices, and that by which they have continued to be marked from all others, is the horse shoe arch. The pointed arch, on the other hand, and the various forms of the trefoil and quatrefoil arches, though there can be little doubt that we are indebted for them to the rich invention of the Moorish architects, have become so entirely Christian as to be no longer associated in our minds with the religion of the prophet. It is said that the pointed arch is to be found in Mohammedan buildings so early as 780 A.D. (Parker's *Glossary of Architecture*), whereas the earliest examples of its use in Christian architecture belong to the 12th c. Moorish architecture probably reached its highest point of development in the Alhambra, with the characteristics of which the English public have been made familiar by means of the court which bears its name in the palace at Sydenham.

ARABIAN GULF. See RED SEA.

ARABIAN LANGUAGE AND LITERATURE. Regarding the oldest literary culture of the Arabians, we possess but slight information. That their poetry at least must have had a very early development, may be inferred from the natural disposition of the inhabitants, who were characterized for their high spirit, courage, love of adventure, and delight in the glory of war. As far back as Solomon's time, the queen of Sheba (probably *Arabia Felix*) was noted for her sententious sayings. The nomadic tribes, living under the patriarchal rule of their sheiks, possessed everything that was favorable to the growth of a simple and natural poetry. They had quick and vivid feelings, and a rich, glowing fancy, which, operating upon the perils, the hardships, and strange confederate life they led in those barren sand-deserts, and amongst naked rocks, could hardly fail to call forth a wild and vigorous minstrelsy. Before the time of Mohammed, the Arabians had celebrated poets who sang the feuds of tribes, and the praises of heroes and fair women. During the great fairs at Mecca and Okadh, poetic contests were held before the people as at the Grecian games; and the poems to which the prize was awarded were rewritten in golden characters, and suspended in the Kaaba at Mecca, the venerable national temple which the Mohammedans affirm to have been built by Abraham, or Ishmael. They are termed the *Moallakât*—i.e., "the suspended"—from the honor conferred on them, and are remarkable for their pathos, soaring conceptions, richness of imagery and phraseology, free and unconstrained spirit, and the glow of their love and hate. Among the famous poets of this early period are Nabegha, Asha, Shanfara—whose works were translated and published by De Sacy in his *Chrestomathie Arabe*—and, lastly, Kaab-ben-Zohair, who lived to celebrate the praises of the prophet Mohammed.

But the most brilliant period of Arabic culture is that which Mohammed himself inaugurated in the Koran. His new doctrines of faith and life, collected under this title by the first calif, Abubekr, were revised and published by Othman, the third calif. The naturally adventurous spirit of the Arabs found a suitable excitement in the half-religious, half military system of Mohammed, and, after his death, their fanaticism prepared them

for their subsequent career. Like an overwhelming torrent, they passed over the neighboring states, and in the short space of 80 years from the death of their prophet, had extended their dominion from Egypt to India, and from Lisbon to Samarcand. During this time nothing can be said of their culture and refinement. A fanatical desire of conquest prevailed. Gradually, however, by their intercourse with civilized nations, the Arabian conquerors were themselves subjected to the humanizing influence of letters, and, after 749 A.D., or during the reign of the Abassides, literature, arts, and sciences appeared, and were generously fostered under the splendid sway, first of Almansor (754-775), and afterwards of the celebrated Harun-al-Raschid (786-809). Learned men were now invited from many countries, and remunerated for their labors with princely munificence; the works of the best Greek, Syriac, and old Persian writers were translated into Arabic, and spread abroad in numerous copies. The calif Al-Mamun, who reigned from 813 to 833, offered to the Greek emperor five tons of gold and a perpetual treaty of peace, on condition that the philosopher Leo should be allowed for a time to give instruction to the former. There are few instances of such a price offered for lessons in philosophy. Under the sway of the same Al-Mamun, excellent schools were founded in Bagdad, Basra, Bokhara, and Kufa; while large libraries were collected at Alexandria, Bagdad, and Cairo. In Spain, the high school of Cordova rivaled the literary fame of Bagdad, and, generally, in the 10th c., the Arabs appeared everywhere as the preservers and distributors of knowledge. Pupils from France, and other European countries, then began to repair to Spain in great numbers, to study mathematics and medicine under the Arabs. There were 14 academies, with many preparatory and upper schools in Spain, and 5 very considerable public libraries; that of the calif Hakem containing, as is said, more than 600,000 volumes. This state of culture, when compared with that prevalent before Mohammed, shows a rapidity of progress in knowledge almost as remarkable as the career of Arabian conquest.

In geography, history, philosophy, medicine, physics, and mathematics, the Arabians rendered important services to science; and the Arabic words still employed in science—such as algebra, alcohol, azimuth, zenith, nadir, with many names of stars, etc.—remain as indications of their influence on the early intellectual culture of Europe. But geography owes most to them during the middle ages. In Africa and Asia, the boundaries of geographical science were extended, and the old Arab treatises on geography and works of travels in several countries by Abulfeda, Edrisi, Leo Africanus, Ibn Batuta, Ibn Foslan, Ibn Jobair, Albiruni the astronomer, and others, are still interesting and valuable.

History was also studiously cultivated. The oldest Arabic historian of whom we know is Mohammed-al-Kelbi (d. in 819). About the same period, however, flourished several other historians. After the dawn of the 10th c., history became a favorite study of the Arabs. The first who attempted a universal survey of the subject were Masudi, Tabari, Hamza of Ispahan, and Euty chius, the Christian patriarch of Alexandria. Masudi's work is entitled *Meadows of Gold and Mines of Gems*. These were followed by Abulfaraj and George Elmakin (both Christians), Abulfeda, and others. Nuvairi wrote a *History of Sicily under the Government of the Arabs*. Various sections of Arabic histories relating to the crusades have been translated into French. On the dominion of the Arabs in Spain, several works were written by Abul-Kasem of Cordova (d. in 1139), Temini, and others. For extended notices we may refer the student of Arabic literature to the translations by Quatremere and others; but especially to the *Encyklopädischen Uebersicht der Wissenschaften des Orients*, by Von Hammer (2 vols. Leip. 1804).

Arabian theology and jurisprudence are intimately connected, and both founded on the Koran; but are by no means so simple and uniform as is generally supposed. Speculation first began to prevail during the Ommaiade dynasty, and the Aristotelian philosophy to be studied by the Arabs. As a consequence, the vague statements of the Koran were soon variously interpreted, and a host of sects gradually arose. Of these 4 only are regarded as orthodox, leaving not less than 72 heretical, whose discordant tenets are stated in the work of Sharistani (edited by Cureton, London, 1842). The four orthodox sects are: the Hanefites, who do not reject tradition, but subordinate it to rationalism; the Shafites, who entirely refuse the aids of reason and philosophy in their treatment of theology; the Kambalites and the Malechites, who allow speculation on points where there is no tradition. The collection of traditions known as the *Sunna* gives an account of the sayings and doings of Mohammed, and, though pedantic in its details, is in substance more valuable than the Koran. The interpretation of the Koran constitutes the principal part of education in theological jurisprudence. The most celebrated of the commentators are Samakhshari and Baidhawi. The conquest of Algiers has rendered the study of Arabic or Mohammedan law indispensable to the French. The result is, that several most important works on that subject have appeared of late from the Paris press, such as *Précis de Jurisprudence Musulmane, selon le Rite Maléechite par Khalil-Ibn-Ishak* (translated by Perron, Paris, 1848), and *Législation Musulmane Sunnite, Rite Hanéfi* (Paris, 1848).

Arabian philosophy, which was of Grecian origin, held the same relation to the Koran as the scholasticism of the middle ages did to the Christian Scriptures—that is, it was regarded as the servant of faith. The chief study of the Arabs was the writings of Aristotle, who became known in Spain, and subsequently in all western Europe,

through translations from Arabic into Latin; though the Arabs themselves only knew the Greek philosopher in translations made during the time of the Abassides. Especial attention was paid to logic and metaphysics. The most distinguished of their philosophical writers are: Alkindi of Basra, who flourished about the beginning of the 9th c.; Alfarabi, who wrote a work on First Principles in 954; Avicenna (d. 1036), who combined the study of logic and metaphysics with that of medicine, and made considerable progress in chemistry, nosology, and medical botany; Ibn Yahya, who acquired a high reputation as an original thinker; Alghazali (d. 1111), who wrote a book entitled *The Destruction of all Idolatrous Philosophical Systems*; Abubekr-ibn-Tofail (d. 1190), who taught in his philosophical novel *Hai-ebn-Yokdan* (edited by Pococke, Oxford, 1671) the development of men from animals; and his pupil, Averrhoes, greatly esteemed as an expositor of Aristotle. For an account of these men and their systems, see *Sur les Ecoles Philosophiques chez les Arabes*, etc., by Schmölders (Paris, 1842), and Ritter's *Ueber unsere Kenntniss der Arab. Philosophie* (Gött. 1844); also Renan's *Averroës et l'Averroïsme* (1850).

Many of these illustrious Arabian physicians were also physicians. The great skill which the Arabs acquired in their knowledge of the uses and properties of medicinal herbs is traced by Humboldt to their geographical position. The southern part of Arabia "is characterized by the highly developed vital force pervading vegetation, by which an abundance of aromatic and balsamic juices is yielded to man from various beneficial and deleterious substances. The attention of the people must early have been directed to the natural products of their native soil, and those brought as articles of commerce from the accessible coasts of Malabar, Ceylon, and eastern Africa. Hence arose the wish to distinguish carefully from one another these precious articles of commerce, which were so important to medicine, manufacture, etc. . . . The science of medicine, when considered with reference to its scientific development, is essentially a creation of the Arabs, to whom the oldest, and, at the same time, one of the richest sources of knowledge—that of the Indian physicians—had been early opened. Chemical pharmacy (see ALCHEMY) was created by the Arabs, whilst to them are also due the first official prescriptions regarding the preparation and admixture of different remedial agents—the dispensing recipes of the present day. These were subsequently diffused over the south of Europe by the school of Salerno" (Humboldt's *Cosmos*, vol. ii. p. 581, Bohn's translation). Pharmacy and *materia medica* naturally led to botany and chemistry. For three centuries, from the 8th to the 11th—a rich scientific culture prevailed. Schools of philosophy and medicine sprung up at Jondisahur, Bagdad, Ispahan, Firuzabad, Bokhara, Kufa, Basra, Alexandria, Cordova, etc. In all departments of medical science a great advance was made, except in anatomy. The reason of this exception lies in the fact that the Koran forbids the dissection of bodies. The most famous writers on medicine are Aharun, Alkindi, Avicenna (q.v.), who wrote the *Canon of Medicine*, for a long time the only handbook on the subject; Ali-ben-Abbas, Ishak-ben-Soleiman, Abulkasim, Averrhoes (q.v.), who wrote a complete system of medicine; Ali-ben-Isa, etc.

In mathematics, the Arabs made great advances by the introduction of the numerals and mode of notation now in use, of the sine instead of the chord (in trigonometry), and of a more extended application of algebra. Astronomy was zealously studied in the famous schools and observatories of Bagdad and Cordova. Alzahan wrote upon optics; Nassireddin translated the Elements of Euclid; Jeber-ben-Afla furnished a commentary on the trigonometry of Ptolemy, etc. The *Almagest* or System of Astronomy by Ptolemy, was translated into Arabic by Alhazi and Sergius as early as 812. In the 10th c., Albatan observed the advance of the line of the apsides in the earth's orbit; Mohammed-ben-Jeber-al-Batani, the obliquity of the ecliptic; Alpetragius wrote a theory of the planets; and Abul-Hassan-Ali on astronomical instruments.

Besides these advances in the solid branches of knowledge, the genius of the Arabs continually flowered into poetry. Numerous poets sprang up in all lands where the children of the desert had carried their irresistible faith. Their verse, however, was not like the rude, simple minstrelsy of a purely patriarchal people; it gradually allied itself to the prevailing culture, and took, especially in the golden epoch of Arabian civilization, a highly artistic form. Motenebbi, Abul-Ala, and others acquired a great reputation for their delicate idylls; Busiri, for his eulogy of Mohammed; Hamadâni, as the first to introduce novels in verse (of which he wrote 400 under the title of *Makâmât*), a style of literature which was brought to perfection by Hariri; Azzeddin, for his ingenious allegorical poem, "The Birds and the Flowers." Besides these, a singularly wild and fantastic prose literature made its appearance, in which the craving for the wonderful and gorgeous, so characteristic of the restless, adventure-loving Arabs, was richly gratified. Romances and legendary tales abounded. The most famous of these are: *The Arabian Nights' Entertainments* (q.v.), *The Exploits of Antur*, *The Exploits of the Champions*, and *The Exploits of the Hero*. In fact, with the exception of the drama, there was no sort of poetry which the Arabs did not attempt. The effect of this universality and richness in Arabic literature was, that it exercised a powerful influence on modern European poetry. The tales of fays, charms, sorceries, and the whole gorgeous machinery of enchantment passed into the poetry of the west. During the middle ages of European history, several of the most popular and wide-spread books were of Arabic origin; such as, *The Seven Wise Masters*, and *The Fables of Bidpai*, though the Arabians themselves borrowed largely from the Persian stories and the Greek fables.

All this culture of the early ages of Mohammedanism presents a strong contrast to the ignorance which now prevails among the Arabs. The brutal fanaticism of the Turks nipped the blooming promise of the east; sunk in stupid indolence, the peoples await in apathetic resignation their deliverance and return to higher modes of life. Literature furnishes now nothing worthy of notice. Learning spends itself principally in commentaries and scholia, in scholastic discussions on the subject-matter of dogmatics and jurisprudence, and in tedious grammatical disquisitions concerning the old Arabic speech, generally acute and subtle, but always unprofitable and unenlivening. The swift and mobile genius of the east has departed, and pedantic dullness has usurped its place. There are "Dryasdusts" even in the desert. A few modern writers have attempted, with more or less success, to imitate European forms of thought and sentiment. Of these may be mentioned Michael Sabbagh of Syria (*La Colombe Messagère*, Arabic and French, Paris, 1805); 'Le Sheik, Refaa of Cairo (*The Broken Lyre*, Paris, 1827; *Manners and Customs of the Europeans*, Cairo, 1834; *Travels in France*, Cairo, 1825); and Nasif-Effendi, of Beirut, who wrote the critical observations in De Sacy's edition of Hariri (*Epistola Critica*, Leipsic, 1848).

The Arabic also possesses a Christian and Jewish literature which, however, is chiefly ecclesiastical. Its principal ornaments are Eutychius, Elmakin, and Abulfaraj. Translations of the Old Testament were made not from the Hebrew, but from the Septuagint, or from Latin versions. In the middle ages, the Spanish Jews employed Arabic for their learned compositions; and several of the most important works of Moses Maimonides, etc., were originally written in that tongue.

The Arabic language, it has been remarked, is at once both *rich* and *poor*. It is necessarily destitute of innumerable words describing those ideas and objects which only civilization can develop or produce; but, on the other hand, the rich and nimble fancy of the Arabians has multiplied, to an almost incredible extent, the synonyms of their desert-tongue, so that in some cases several hundreds of expressions are found for the same thing. The Arabic belongs to the so-called Semitic family of languages, among which it is distinguished for its antiquity and soft flexible grace. It is divided into two dialects—a northern and southern. The former, through the instrumentality of the Koran, became the predominant language of literature and commerce throughout the whole extent of the A. dominions; the latter, called the Himyarite, although in all probability the source of the Ethiopic language and writing, is known as yet only by a few inscriptions, etc. The earliest Arabic grammarian is Abul-Aswad-al-Duli, who flourished under the fourth calif, Ali. The first who reduced the prosody and metre of the Arabian poets to a system, was Khalil-ben-Ahmed-al-Ferahidi of Basra. Al-Jauhari, who died in 1009 A.D., drew up a dictionary of the pure Arabic speech, which he entitled *Al-Sihah* ("Purity"), and which is held in high estimation to this day. Mohammed-ben-Yakub-al-Firuzabadi, who d. in 1414, was the author of an Arabic Thesaurus, entitled *Al-Kamus* ("The Ocean"), which is the best lexicon in the language, and has consequently been translated into Persian and Turkish. Jordshani has explained, in alphabetical order, the meaning of the technical terms used in Arabic art and science. His work was published by Flügel (Leip. 1845), under the title of *Definitiones*. Meidani made a large collection of Arabic "saws," apothegms, etc., which was published by Freytag, Bonn, 1838. Through the conquests of the Arabs in Sicily and Spain, their language became known in Europe; but notwithstanding the numerous traces of its influence in various European tongues, it became forgotten after the expulsion of the Moors from Spain. The first European scholars who earnestly took up the subject were the Dutch, in the 17th c.; after them, the Germans, French, and English. It is now, however, beginning to be considered a necessary part of a learned theological education. The modern Arabic of the inhabitants is substantially the same as that of the Koran, but the lapse of time has gradually introduced changes in the grammatical forms of the language, similar to those which have occurred in other languages. The purest Arabic is said to be spoken in Yemen, or *Arabia Felix*. With the exception of the Roman characters, the Arabic have been more widely diffused than those of any other tongue on the face of the earth. (See Möller's *Oriental Palæography*, Eisleben, 1844, etc.)

Arabic Writing.—Like all Semitic writing, this proceeds from right to left. It is borrowed from the old Syriac, and was probably introduced into Arabia by Christian missionaries about the time of Mohammed. In its oldest form it is called Kufic, from the town of Kufa, on the Euphrates, where the transcription of the Koran was busily carried on. Its characters are rude and coarse, and it has particular symbols for only 16 of the 28 Arabic consonants. This writing, nevertheless, continued to be employed for 300 years, and for coins and inscriptions even later; but in the 10th c. it was displaced for common purposes by a current handwriting, the *Neshki*, introduced by Ebn Mokla. This is the character still in use. In it, the consonants which resemble each other are distinguished by points, and the vowels by strokes over and under the line.

ARABIAN NIGHTS' ENTERTAINMENTS, a collection of Oriental tales, first made known to Europe by Antony Galland, a French orientalist, under the title of *The Thousand and One Nights, Arabian Stories, Translated into French*. They were published at Paris, in 12 vols. 12mo, from 1704 till 1717, and were received by many as the production of the genius of the translator himself, rather than the collection of an *unknown*

Arabian author, as Galland had stated in his dedication. Oriental scholars did not hesitate at first to declare against their authenticity, and denounce them as forgeries. Having taken only an obscure place in the literature of the east, and their style unfitting them from being classed among models of eloquence or taste—having no object of a religious, moral, or philosophical kind in view, while the manners and customs delineated in them were different from all received ideas of those of the Moslem nations—their success took the critics by surprise. The work became highly esteemed by the public; it filled Europe with its fame; it had abundance of readers, and no lack of editors. Few books have been translated into so many different languages, and given delight to so large a number of readers. It may be said that, in these Oriental tales, there has sprung up a new branch of literature, for their influence on the literature of the present day is easily discernible. Here are found, depicted with much simplicity and great effect, the scenes of the town-life of the Moslem. The prowess of the Arab knight, his passion for adventure, his dexterity, his love and his revenge, the craft of his wives, the hypocrisy of his priests, and the corruptibility of his judges, are all dramatically delineated—far more vividly represented, in fact, than is possible in a book of travels; while gilded palaces, charming women, lovely gardens, and exquisite repasts captivate the senses of the reader, and transport him to the land of wonder and enjoyment. Besides entertaining the mind with the kaleidoscopic wonders of a teeming and luxurious fancy, which is their most obvious merit, they present a treasure of instruction upon life in general, and oriental life in particular. And this is undeniable, notwithstanding the fact, that the aspects of society they depict are far from standing high in the social scale, either as to civilization or morality. In them no story is to be found that will rank in morality with the story of Joseph and his brethren, simply because the Moslem faith will not admit of that, any more than the decline of Arab civilization at the time the tales must have been originally promulgated. Indeed, the first translator, having a conviction of a demoralizing tendency of this kind, avoided giving several objectionable parts of some of the stories. The thread of the narrative in these entertainments is generally simple and clear, often leading into the departments of fable, and occasionally into the regions of the supernatural and the domains of popular superstition. The tales, even when long, are not tiresome; for they consist of shorter stories branching off from the main one, or rather incased within it, the smaller within the larger, and perhaps a smaller within that, like the little boxes used by conjurors.

For many years all doubt as to the authenticity of the *Thousand and One Nights* has been dispelled. Several MS. copies have been found, and no less than four editions of the Arabic text have been published. A more thorough acquaintance with medieval and modern Arab life has proven the genuineness of the stories, and the truthfulness of their general representation of the mind of the Moslem. In them there are evident signs of a declension from a refined and superior civilization; the marvelous and supernatural is predominant; despotism in all its forms is manifest; and a prevalent falsity and insincerity of character visible, not only in the narrative, but in the tone of common conversation, replete as it is with oaths and asseverations.

The origin of the work—where and by whom written—is still involved in mystery. According to some, the tales are susceptible of a threefold division. The most beautiful, and in fancy the richest, appear to have come from India, the cradle of story and fable; the tender and often sentimental love tales seem of Persian origin; while the masterly pictures of life, and the witty anecdotes, claim to be the product of Arabia. Throughout, however, everything is conformable to the character and customs of the town population of Arabia, and to the Mohammedan faith. The baron de Sacy, in 1829, thus stated his opinion on these points. Speaking of the work he says: "It appears to me that it was originally written in Syria, and in the vulgar dialect; that it was never completed by its author; that, subsequently, imitators endeavored to perfect the work, either by the insertion of novels already known, but which formed no part of the original collection, or by composing some themselves, with more or less talent, whence arise the great variations observable among the different MSS. of the collection; that the inserted tales were added at different periods, and perhaps in different countries, but chiefly in Egypt; and, lastly the only thing which can be affirmed, with much appearance of probability, in regard to the time when the work was composed, is—that it is not very old, as its language proves, but still that, when it was brought out, the use of tobacco and coffee was unknown, since no mention of either is made in the work."

Galland's French edition was speedily translated into all the languages of Europe; edition following edition with great rapidity, some of them with enlargements and others with modifications. Latterly, a Dr. Scott gave a superior English edition, "carefully revised, and occasionally corrected from the Arabic." At length a new English translation from the Arabic, with copious notes and highly artistic embellishments, appeared in 1839. It was the work of Edward William Lane, a gentleman whose long residence in Egypt enabled him to acquire so thorough a knowledge of the language, manners, and customs of the Egyptian Arabs, as has furnished not only a superior version, but a series of notes embodying a portraiture of Egypto-Arabian life at once faithful and vivid. See Kirby's translation, and the Villon society edition (1882-84).

The popularity of this wonderful book has given rise to hundreds of imitations. Among the best of the French are—*Les Mille et Un Jours*, *Mille et Une Quart d'Heures*,

and the *Contes d'un Endormeur*; perhaps the best of the English imitations is the *Tales of the Genii*, by Sir Charles Morell; while the best of the German appears to be one got up from the Perso-Arabic, the *Faraj bād el Shidda* (Joy after Sorrow), a popular work, and repeatedly published.

ARABIAN NUMERALS or **CIPHERS**—the characters 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Properly, they should be styled Hindu or Indian numerals, for the Arabs borrowed them, along with the decimal system of notation, from the Hindus. According to one account, Gerbert (afterwards Sylvester II.) learned the use of them from the Moors in Spain in the 10th c.; others think it more probable that Leonardo of Pisa (see ALGEBRA) first introduced them from the east into Italy about 1202. Yet the use of them was long in making its way, and was not general before the invention of printing. Accounts continued to be kept in Roman numerals up to the 16th century. See NUMERALS and NUMERATION.

ARABIAN SEA, anciently *Mare Erythræum*, or the *Red Sea*, that bay of the Indian ocean which lies between India on the east and Arabia on the west. Its northern boundary is Beloochistan; while its natural and convenient limit on the south is a line drawn from cape Comorin in Hindustan to cape Guardafui in Africa, and thence continued along the coast to the strait of Bab-el-Mandeb. In e. long. it extends from 43° 32' at cape Bab-el-Mandeb, to 77° 30' at cape Comorin; and in n. lat. from 8° 5' at cape Comorin, to about 26° at the s.w. point of Beloochistan. Including its two great arms, the Red sea proper and the Persian gulf, it stretches far both north and west. By the former it is, since the opening of the Suez canal in 1869, connected with the Mediterranean sea. In this last aspect the A. S. long occupied a most prominent place in the commerce of the world—a place which, after having lost it for more than 300 years through the doubling of the cape of Good Hope in 1497, it has lately in a great measure regained, through the enterprise of English capitalists, the Egyptian government, and the perseverance of M. Lesseps.

In the history of navigation, also, the A. S. proper is specially entitled to notice. It was along its northern shores that Nearchus, the admiral of Alexander of Macedon, conducted the first well-authenticated voyage, on a large scale, of exploration and discovery; and across it the trade-winds, blowing alternately from n.e. and s.w., were wont to waft the Greeks of Egypt, without either chart or compass, about the commencement of the Christian era. See SUEZ CANAL.

ARABICI, or **ARABIANS**, a sect in Arabia, in the 3d c. who held that the soul dies with the body and will be raised again with it. Eusebius says that Origen convinced them of their error, and they renounced it at the "Council of Arabia," A.D. 246.

AR'ABINE is the essential principle of gum-arabic (see GUM), and is obtained pure by adding alcohol to a solution of gum-arabic in water, when the A. is precipitated in white flocculi.

ARABO-TEDESCO, a term sometimes used to denote Byzantine art (q.v.), and the combination of Moorish and Gothic art in northern Italy.

ARACAN', or **ARAKAN**, long the most northern division of British Burmah, is bounded on the n. by Chittagong, on the e. by Ava, on the s. by Pegu, and on the w. by the bay of Bengal. It extends in n. lat. from 18° to 21° 33', and in e. long. from 92° 10' to 94° 50'. Its extreme length is 400 m.; and its breadth from 90 m. at the n., gradually diminishes towards the s., so as to yield an average of little more than 15. The area is 14,526 sq. miles. A range of mountains, nearly parallel with the line of coast, the highest point 7000 ft. above the sea-level, separates A. from Pegu and upper Burmah. The soil of the northern portion of A. is alluvial; but the country is hilly, difficult of access, and covered with forest. The province is divided into four districts—Akyab, Sandoway, Ramree, and North Aracan. The British conquest of the province has been highly beneficial in every way. In 1825–26, the population was only about 100,000; in 1831 it was 173,000, showing an increase of 73 per cent in 5 or 6 years; in 1839 it had increased to 248,000; before 1854 it was upwards of 321,000; in 1872, 483,363; according to the census of 1881, 587,518, and of 1891, 669,540. With these results the face of the country and the state of trade fully correspond. Rice and salt constitute the chief articles of exportation; the others are tobacco, sugar, wood, oil, betel nuts, buffalo hides and horns.

There have been various indications of a volcanic nature in A. In the islands of Ramree and Cheduba there exist springs of muddy water which emit bubbles of gas. Two severe earthquakes have taken place respectively in 1763 and 1833, the latter having thrown up, in several places, muddy water of a sulphurous smell, and also, on one particular spot, vapor and flame to the height of several hundred feet. Of the mineral resources very little is known. Iron-ore has been found, but not in such quantity and quality as to come into profitable competition with British iron. Coal also exists, which is understood to be good, but, from whatever cause, it has not been extensively worked. There are no lakes in the province, nor are there any rivers of much importance, though the Aeng, which appears to be the most available among them, is said to be navigable during spring-tides to 45 m. from its mouth.

ARACAN, or **MRO-HAUNG**, a city of British Burmah, and formerly the capital of the province of the same name. It is situated about 50 m. from the sea, in lat. 20° 42' n.

and long. 93° 24' e. Lying in a swampy valley which, on almost every side, is confined by hills, A. is subject to febrile disease in all its forms. Previous to the first Burmese war—the occasion which brought it under British dominion—it is said to have contained 18,000 houses; while in 1835, after an interval of less than 10 years, its population is represented as having been only 8000, and later little more than 2000; the decrease, the consequence of its having ceased to be the seat of government. A. is now, in fact, interesting only from its old associations. The most striking memorial of antiquity is its dilapidated fort, consisting of three concentric walls such as only a powerful state could have constructed. Beyond the limits, too, of this citadel, the town, as a whole, appears to have been surrounded by a circumvallation of 9 m. in length, composed partly of steep and rugged eminences and partly of artificial works. These defenses, which are believed to be several centuries old, the British carried by assault on 1st April, 1825.

ARACA'RI, or ARICARI, *Pteroglossus*, a genus of birds closely allied to the toucans (see TOUCAN), and differing from them chiefly in the somewhat smaller bill, which is not so thick as the head. They are generally also of smaller size, and the prevailing color of their plumage is green, often varied with brilliant red and yellow. Like the toucans, they are natives of the warm parts of South America.

ARACA'TI, a t. and port in Brazil, on the river Jaguaribe, 10 m. from its mouth, and 75 miles south-east of Ceara. It is well built, has several churches and a town hall. The exports are hides and cotton. Population about 6000.

ARACEÆ. See ARUM.

ARACHIS, a genus of plants of the natural order *leguminosæ*, sub-order *papilionaceæ*, natives of the warm parts of America, of which, until recently, the only known species was the *A. hypogæa*, sometimes called the underground kidney-bean, and more frequently the ground-nut. It also receives the names of earth-nut, American earth-nut, and mandubi. It is an annual plant, with hairy pinnate leaves, which have four leaflets. The flowers are yellow, the standard veined with red. After flowering, the flower-stalks elongate and bend towards the earth, into which the pods penetrate, ripening underground. The pods have a lining of a sort of network, and generally contain two, three, or four seeds, which are about the size of a hazel-nut, of a sweet taste, with a little of the flavor which belongs to most kinds of pulse. This plant is now cultivated in all the warm regions of the globe, and its usefulness is such that its cultivation is likely to extend. It was introduced from Peru into Spain, and thence into France. It succeeds in favorable situations even in the middle of France, where it is sown after all danger of frost is thought to be over, and yields from eighty to a hundred fold. Its cultivation is so general in the western parts of Africa, and even in the interior, that doubts have been therefore entertained of its American origin, of which, however, the most eminent botanists seem to be quite satisfied. The seeds are sometimes eaten raw, but more generally boiled or roasted. In New Spain, and in some parts of Africa, they form one of the principal articles of food; but the importance of the plant is chiefly owing to the fixed oil contained in them, which is used for the same purposes as olive or almond oil, and is quite equal to olive oil either for lamps or for the table. This oil is also much used in Spain in the manufacture of soap and of chocolate. A bushel of the seeds yields one gallon of oil, when expressed cold; if heat is applied, the quantity is greater, but the quality inferior. It has become a considerable article of commerce. The *A. hypogæa* delights in a light and sandy, but at the same time fertile, soil. The seeds are dug up as roots or tubers usually are. The root has qualities resembling those of licorice, for which it is sometimes used. The herbage is good food for cattle. Several new species of this genus have been discovered in Brazil.

ARACHNIDA, or ARACHNIDES (from the Gr. *arachne*, a spider), a class of articulated animals, commonly regarded as intermediate between insects and crustacea. They were included by Linnæus amongst insects, and placed in the order *aptera*. Like the crustacea, they have the head and thorax united into one piece, but they differ from them and from insects in having simple eyes, and in the absence of proper antennæ, instead of which many of them are provided with a sort of antennal claws called *chelicerae*. These and other organs connected with a complex mouth, disappear, however, in some of the lower kinds, which have merely a sort of proboscis for suction. Some of them breathe by means of pulmonary cavities; others, by tracheæ, like insects; and upon this difference is founded the primary division of the class into two orders—*pulmonaria* and *trachearia*. Spiders and scorpions belong to the first of these orders, and mites, ticks, etc. (*acari*), to the second. Some of the A. inhabit water, but their mode of respiration is that of terrestrial animals; and they seem to carry air with them by means of the hair which covers their bodies. The sexes are distinct. They are oviparous. They have two or more eyes, very frequently eight; and the relative position of these affords marks for distinction of genera. They have generally eight legs, but some have only six. With the exception of the acari, they are solitary in their mode of life, and most of them prey upon insects, of which, however, in general, they only suck the blood. Some of the lower kinds are parasitic upon insects, and a few live on decaying animal and vegetable substances. See ACARUS, MITE, SCORPION, SPIDER, and TICK.

ARACHNOID MEMBRANE, one of the three coverings of the brain and spinal cord, is a thin, glistening, serous membrane, which, by its parietal layer, adheres inseparably to the dura-mater on its outer side, and more loosely to the pia-mater, which is between it and the brain substance. Between the pia-mater and the A. M. in some situations there are considerable intervals (sub-arachnoid spaces); they are filled with a fluid named cerebro-spinal, the presence of which is necessary to the proper action of the nervous centers. See **CEREBRO-SPINAL FLUID**; **NERVOUS SYSTEM**.

ARA CÆLI (Lat. "Altar of Heaven"). The name given to a famous church in Rome of great antiquity and said to be built on the spot where the Roman emperor Tiberius saw a vision of the Virgin and Child. It stands on the Capitoline Hill.

ARAD, a t. in the district of A. in upper Hungary. It is situated on the right bank of the Marosh, an affluent of the Theiss, and is also styled Old A., to distinguish it from New A., which is built on the opposite side of the river. A. had a pop. in 1890 of 42,100, including many Jews, who are very wealthy. It carries on a large trade in corn, tobacco, etc., and was at one time the greatest cattle-market in Hungary, and is even yet only inferior to Pesth and Debreczin. During the 17th c., it was often captured, and at last destroyed by the Turks. Its new fortifications, erected in 1763, made A. an important position in the revolutionary war of 1849, when it was occupied for a considerable time by the Austrian general Berger, who capitulated here in July, 1849. From this place Kossuth issued his proclamation of Aug. 11, 1849, in which he expressed in impassioned terms his despair of the Hungarian cause for the present. After the catastrophe of Világos, on the 17th Aug., A. was surrendered to the Russians through the treachery of Görgey.

NEW A., a t. in the Banat of Temesvar, contains 5600 inhabitants, including many Germans, who are the principal persons in the place. The district or province of A. has an area of 1700 sq. m.

ARADUS (now **RUAD**), a rocky island of about 600 acres, off the mouth of the river Eleutherus, 2 m. from shore and 35 or 40 m. n. from Tripoli. Strabo says that the city of A. was founded by fugitives from Sidon. It was independent, ruled over the adjacent coast, and assisted the Macedonians in the siege of Tyre. Later, the town became subject to Persia, to Antiochus Epiphanes, and to Rome. In 638, the caliph Omar's commander destroyed A., and it was not rebuilt. The ruins show that it was once a very strong place. At present A. has a small population.

ARAF, the purgatory of Islam, the place between paradise and hell, doubtless a place of purification by fire.

AREOMETER. See **AREOMETER**.

ARAFAT, MOUNT, or *Jebel-er-'rahme* (mountain of mercy), is a granite hill about 15 m. s.e. of Mecca, which is believed by the Mohammedans to be the spot where Adam, conducted by the angel Gabriel, met again his wife Eve, after a punitive separation of 200 years, on account of their disobedience in Paradise. It is not above 200 ft. high, but its circuit is a mile and a half. Its importance since the time of Mohammed arises from its being the scene of a yearly procession of the faithful who visit Mecca. Burckhardt, who witnessed the procession of 1814, states that not less than 70,000 people were present, and that at least forty different languages were spoken. The principal part of the religious ceremony of this pilgrimage is a sermon, the hearing of which entitles all to the name and privileges of a hadji.

ARAGO, DOMINIQUE, a celebrated French astronomer and natural philosopher, was b. Feb. 26, 1786, at Estagel, near Perpignan, in the department of the eastern Pyrenees. At the early age of 17, he entered the polytechnic school at Paris, where the spirit, promptitude, and vivid intelligence he exhibited in his answers to the questions of Legendre, excited the admiration of every one. In 1804, he became secretary to the observatory at Paris. Two years afterwards, he was engaged, with Biot and others, by the French government, to carry out the measurement of an arc of the meridian, which had been commenced by Delambre and Méchain. A. and Biot had to extend it from Barcelona to the Balearic isles. The two *savants* established themselves on the summit of Mt. Galatza, one of the highest of the Catalonian branch of the eastern Pyrenees. Here they lived for many months, communicating by signals with their Spanish collaborators, across the Mediterranean in the little isle of Ivica, though many a night the furious tempests destroyed their hut along with the labors of weeks. Visitors they had none, except two Carthusian monks, who were wont to come up and spend a portion of the evening in converse with them. Before A. had completed his calculations, Biot had returned to France, and war had broken out betwixt the two nations. A. was now held to be a spy; his signals were interrupted; and with great difficulty he succeeded in making his escape to Majorca, where he voluntarily imprisoned himself in the citadel of Belver, near Palma. At last he obtained his liberty on condition of proceeding to Algiers, which he did; but was captured, on his return to France, by a Spanish cruiser, and sent to the hulks at Palamos. He was, however, liberated after a time, and sailed once more for France; but almost as he was entering the port of Marseilles, a tempest arose which drove the vessel across the Mediterranean all the way to Algiers. The former day, to whose

demands he had owed his liberation from the hulks, was dead; his successor, a ferocious tyrant, placed him on his list of slaves, and intended to employ him as interpreter. After some time, he was released at the request of the French consul, and, narrowly escaping another capture by an English frigate, finally found his way to Marseille in July, 1809. As a reward for his suffering in the cause of science, the Academy of Sciences suspended its standing rules in his favor; and though only 23 years of age, he was elected member in the place of Lalande, who had just died, and was appointed professor of analytical mathematics in the Polytechnic School. Afterwards, his attention was devoted more to astronomy, magnetism, galvanism, and the polarization of light. In 1811, he read a paper to the Academy, which may be considered the foundation of "chromatic polarization." In 1812, he commenced his extraordinary course of lectures on astronomy, etc., which fascinated all Paris—the *savants*, by their scientific rigor and solidity; the many, by their brilliancy of style. In 1816, along with Guy Lussac, A. established the *Annales de Chimie et de Physique*, and confirmed the truth of the undulatory theory of light. In the same year he visited England for the first time, and made the acquaintance of various persons distinguished in science, especially Dr. Thomas Young. In 1818 appeared his *Recueil d'Observations géodésiques, astronomiques et physiques*. In 1820, he turned his facile and inventive genius into a new channel, and made several important discoveries in electro-magnetism. Oersted had shown that a magnetic needle was deflected by a voltaic current passing along a wire. A. pursued the investigation, and found that not only a magnetic needle, but even non-magnetic substances, such as rods of iron or steel, became subject to deflection also, exhibiting, during the action of the voltaic current, a positive magnetic power, which, however, ceased with the cessation of the current. Some time after, he demonstrated that a bar of copper, and other non-magnetic metals, when moved circularly, exert a noticeable influence on the magnetic needle. For this discovery of the development of magnetism by rotation, he obtained, in 1825, the Copley medal of the Royal Society of London; and in 1834, when he again visited Great Britain, especial honors were paid to him by the friends of science in Edinburgh and Glasgow. Four years previous to this second visit to Great Britain, he had received the honor he most coveted—that of being made perpetual secretary of the Academy. It was while holding this office that he wrote his famous *éloges* of deceased members, the beauty of which has given him so high a place among French prose-writers. As a politician, also, his career was remarkable. He was a keen republican, and took a prominent part in the July revolution (1830). In the following year he was elected by Perpignan as member of the chamber of deputies, where he occupied a position on the extreme left. In the February revolution of 1848, he was chosen a member of the provisional government, and appointed minister of war and marine. In this position he resisted the proposed measures of the socialist party, regarding the constitution of the United States as the beau-ideal of democracy. His popularity in his own province was the means of preventing the discontented population of the east Pyrenees from proceeding to lawless and violent measures. On the question of the presidency, A. opposed Louis Napoleon, declared himself against the policy of the new ministry, and refused to take the oath of allegiance after the *coup d'état* of 1851. The emperor, in a letter, paid a high eulogium on his talents and virtues, and made a special exception in his case. A. died Oct. 3, 1853. In his general character A. was sociable, energetic, and fond of fame. He was the intimate friend of Alexander von Humboldt.

ARAGO, EMMANUEL, author and French politician; b. Paris, Aug. 6, 1812. In youth he produced a volume of poems and some plays, but at the age of 25 left literature for the bar, where he soon became eminent in political cases. He became an ardent republican, and defended such political recusants as Martin Bernard and Barbes. On the 24th of Feb., 1848, when the abdication of the king was announced in the chamber, A. rose, and, proclaiming that by that act royalty was extinct, demanded the deposition of the Orleans family, and protested against a regency. Under the provincial government, A. was sent to Lyons as commissary general, and prevented a serious insurrection by applying half a million francs to relieve immediate distress. He was afterwards a member of the general assembly for the department of Eastern Pyrenees, and was envoy to Prussia, where he interested himself for the oppressed Poles, procuring the liberation of Gen. Microlawski. He resigned as soon as Napoleon was elected, and became one of the future emperor's most active opponents, vigorously protesting against the expedition to Rome. After the *coup d'état*, Dec. 2, 1851, he quitted political life, returning to his law practice, but became a member of the provisional government in 1870, afterwards minister of justice and minister of war; was elected to the senate in 1876 and in 1891. D. 1896.

ARAGO, JACQUES ÉTIENNE VICTOR, brother of the great *savant*, was born in 1790. In 1817, he accompanied the expedition, under Freycinet, in a voyage round the world. Afterwards, we find him engaged, first at Bordeaux, and then at Toulouse, in several branches of light literature, industriously writing, in company with other scribes, a multitude of vaudevilles, besides publishing several poems and romances. In the year 1835, he undertook the management of the theater at Rouen; but having become afflicted with blindness, he was compelled to resign this post in 1837. To his early voyage round the world we owe two very pleasant books of travel: *Promenade autour du Monde* (Paris,

1838), *Souvenirs d'un Aveugle; Voyage autour du Monde* (Paris, 1838). In 1849, though deprived of sight, he formed a company of speculators; placed himself at the head of it, and departed for California, to search for gold on a large scale. His companions mutilated and left him, deserted and disappointed, at Valparaiso. On his return, he published his painful experiences, under the title, *Voyage d'un aveugle en Californie et dans les Régions aurifères* (Paris, 1851). He d. Jan. 1, 1855.—A., ETIENNE, another brother of the astronomer, was b. 1802, and became widely known as a popular *feuilletoniste* in the *Sibole* and other journals. He held an appointment under the provisional government, as director-general of the post-office, in which he displayed great vigor, promptitude, and sense, and achieved several postal reforms; was elected member of the national assembly; was compromised by the insurrection in June, and sentenced to exile for life. In 1859, he returned to France; and at the time of the Franco-Prussian war was mayor of Paris—an office which he soon resigned. D. 1892.—A. JEAN, another of the brothers A., b. 1789, d. 1836, was general of the republican army in Mexico, and wrote, in Spanish, a history of Mexico.

ARAGON, once a kingdom, then a province in the n.e. of Spain, lies between 40° 2' and 42° 54' n. lat., and long. 2° 10' w. and 0° 45' e. Greatest length from n. to s., 190 m.; breadth, 130. Area, 17,900 sq. m. Pop. '87, 910,830. It is bounded, n., by the Pyrenees, separating it from France; w., by Navarre, and Old and New Castile; s., by Valencia, and part of New Castile; and e., by Catalonia, and part of Valencia. The river Ebro, which descends from the northern heights of Old Castile, flows through the middle of A. in a south-easterly direction, receiving numerous tributaries both from the lofty regions of the Pyrenees and from the Sierras in the south; of the former, the principal are the Noguera, which forms the boundary-line between Aragon and Catalonia, the Essera, and the Gallega; of the latter, the principal are the Guadaloque, the San Martin, and the Salon. The province is naturally divided into the level country, along the Ebro, and the northern mountainous district of upper Aragon. The central plain is sterile, poorly supplied with water, and intersected by deep ravines (*barancoes*). Agriculture is here confined to the raising of maize, vines, and olives; but on the sides of the Ebro, where water abounds, rice and other grains are abundantly produced; and in the valleys of upper A., which are at once the most beautiful and fertile of all the Pyrenean valleys, we find a splendid vegetation, and a soil that enables the inhabitants, in spite of the wretchedness of their agriculture, to grow considerable quantities of wheat, rye, maize, barley, etc. The climate of the province is various; comparatively cool in the mountain-districts, but often very sultry on the plains. Spurs of the Pyrenees strike down into the province a long way. It is between these ridges that the rich valleys lie, some of them upwards of 20 m. long. The slopes of the hills are clothed with forests of oak, beech, and pine, and the felled timber is floated down the rivers into the Ebro, and thence down to Tortosa at its mouth. The minerals of the province are copper, lead, iron, salt, alum, saltpetre, coal, and amber. The manufactures are inconsiderable. A., peopled by a brave, active, enduring, but obstinate race, has frequently been the arena of sanguinary warfare. It early became a Roman province; and, on the fall of the empire, passed into the hands of the West Goths, but was conquered by the Moors in the beginning of the 8th century. The rulers of A., after it had been recovered from the Moors, and united with Catalonia (1137), became powerful; obtained possession of the Balearic isles in 1213, of Sicily in 1282, of Sardinia in 1326, and of Naples in 1440. By the marriage of Ferdinand with Isabella, heiress of Castile, in 1469, the two states of A. and Castile were united, and formed the foundation of the great Spanish monarchy. After Ferdinand's death in 1516, the union of the states was made permanent. In the war with the French, 1808-9, Saragossa, the capital of A., was remarkable for its heroic defense under Palafox; and in recent Spanish wars the people of A. have displayed the same courage which marked their conduct on that memorable occasion. Upper A. was on the side of the queen; but lower A. generally adhered to the party of Don Carlos. The province is now divided into three departments—Saragossa, Teruel, and Huesca. The chief towns are Saragossa, Calatayud, Huesca, and Teruel. See SARAGOSSA, etc.

ARAGONA, a t. of Sicily, 8 m. n.e. from Girgenti. It is a poor t., and stands in the midst of bare green downs; but the hills above it are clothed with pines, cypresses, olives, almonds, and carobs. The only object of interest is the old castle of the princes of A., a huge building, in the renaissance style, which has fallen much into decay. Pop. 11,000.

ARAGUA, a former state of Venezuela, in a fertile region on the river A. It is a small division, only about 3700 sq. m.; pop., estimated, 81,500. Chief t., Victoria.

ARAGUAY, a large river of Brazil, rising in s. lat. 18° 10', and w. long. 51° 30'. Like most of the considerable rivers of the country, it flows towards the n. After a course of about 1000 m. to San Joao, it there joins the Tocantins, which again, after a northerly course of 300 m. more, mingles its estuary with that of the Amazon round the Isle of Marajo. Like most of the rivers in this part of Brazil, the A. is of difficult navigation, being frequently interrupted by rapids.

ARAGUAY'A, or **ARAGUIA**. See **ARAGUAY**.

ARAKTCHÉV'EF, ALEXEI ANDREEVITCH, Count, 1769-1834; a Russian general. Of low origin, he rose rapidly to high rank under the favoritism of Paul, who made him governor of St. Petersburg and commander of his personal guards. After Paul's assassination, A. was kept near the person of Alexander, the succeeding emperor, and in the late years of that emperor's reign, A. became practically the ruler. He was energetic, but cruel, and always untrustworthy. It is recorded that he left in his will a prize for the best history of Alexander's reign, to be written a century after the death of the emperor, and it is supposed that this part of the testament was canceled by Alexander.

ARAL, LAKE, next to the Caspian sea, from which it is separated by the plateau of Ust-Urt, is the largest lake in the steppes of Asia. It lies wholly within the limits of Russian Central Asia, between 43° 42' and 46° 44' n. lat., and 58° 18' and 61° 46' e. long. It is fed by the river Sir (the ancient Jaxartes) on the n.e. side, and the Amu (or ancient Oxus) on the s.e. It is shallow, and has no outlet. Its level is 117 ft. above that of the Caspian, and 33 ft. above that of the Black sea. Like other lakes which are drained only by evaporation, it is brackish. Owing to the shallowness of its waters, navigation is difficult; but Russian steamers have been launched upon it, and took part in the operations against Khiva in June, 1873. The history of the sea of Aral is very remarkable. Sir Henry Rawlinson and Col. Yule have recently collected references made to it in Greek, Latin, Arabic, and Persian writers, and have established the fact that the area it now occupies has been dry land twice within historical times—the Jaxartes and the Oxus then running s. of the sea of Aral to the Caspian. This was the case during the Greco-Roman period, and again during the 13th and 14th centuries after Christ. The Russian government has undertaken the restoration of the Oxus to its old bed.—See *Proceedings of Royal Geographical Society*, vol. xi., vol. xvi., and vol. i. (new series, 1879); also *The Shores of Lake Aral*, by major Wood (Lond., 1876).

ARALIA, a genus of plants, the type of the natural order *araliaceæ*. This order is dicotyledonous or exogenous, and consists of trees, shrubs, and herbaceous plants, resembling the *umbellifera* (q.v.) both in their general habit and in their botanical characters, but differing essentially in the fruit, which is not *didymous* or formed of two separable carpels as in the *umbellifera*. The fruit of the *araliaceæ* consists of several one-seeded cells, and is often succulent. The order contains about 160 known species, natives of tropical, temperate, and cold climates, generally possessing stimulant and aromatic properties. Poisonous qualities are not developed as in the *umbellifera*. The herbage of many species affords good food for cattle, and some are used for human food. The genus **ARALIA** contains a considerable number of species—trees, shrubs, and herbaceous plants. It has a succulent fruit, with 5 or 10 cells, crowned with the styles. *A. nudicaulis* is a native of the United States of America, a species of humble growth, having a solitary radical leaf with a trifid stalk and ovate serrated segments; the scape is shorter than the leaf. The root is said to be equal in value to sarsaparilla as an alterative and tonic. *A. racemosa*, *A. spinosa*, and *A. hispida*, also natives of North America, produce an aromatic gum resin. *A. spinosa* is a stimulant diaphoretic. The berries, infused in wine or spirits, are employed in America as a cure for rheumatism. It is sometimes called toothache-tree; it also bears the name of angelica-tree. It is a native of moist woods in Virginia and Carolina, growing to a height of 10 or 12 ft., with a single stem, spreading head, doubly and trebly pinnate leaves and ovate leaflets, and is very ornamental in a lawn. *A. polaris*, found in the southern island of New Zealand, and in the greatest abundance and luxuriance in Lord Auckland's islands, is described by Dr. Hooker as a "very magnificent plant," a herbaceous perennial, 4 to 5 ft. high, with large orbicular masses of green foliage and waxy flowers, presenting a very striking appearance. *A. edulis*, now called *dimorphanthus edulis*, is employed in China as a sudorific. Its shoots are very delicate and pleasant when boiled; and the roots, which have an agreeable aromatic flavor, are used by the Japanese as carrots or parsnips are in Europe. *Aralias* abound in the warm valleys of the Himalaya. The natives collect the leaves of many as fodder for cattle, for which purpose they are of great value in a country where grass for pasture is scarce; but the use of this food gives a peculiar taste to the butter. Chinese rice paper has been ascertained to be cut from cylinders of the pith of an *A.* Ginseng (q.v.), the root of a species of panax, is one of the most important products of the order *araliaceæ*. The astringent roots of *gunnera scabra*, or panke, are used in tanning, but its fleshy leaf-stalks are eaten like those of rhubarb. It has been seen on the sandstone cliffs of Chiloe with leaves nearly 8 ft. in diameter, each plant with four or five of these enormous leaves. It has been introduced into Britain, and is found to succeed well in the climate of Edinburgh. The only representatives of this order in the British flora are the ivy (q.v.), and a small plant called the tuberous moschatel (*adoxa moschatellina*).

A'RAM, EUGENE, was b. in 1704 at Ramsgill, in Yorkshire. His father was a gardener, and could afford to keep A. at school only for a short time; but even while assisting his father, he contrived to gratify his passion for learning. At an early period of his life he married, and became a schoolmaster, first in Netherdale, and afterwards at Knaresborough, where he continued to reside till 1745. In the town of Knaresborough lived one Daniel Clarke, a shoemaker, and an intimate acquaintance of A.'s. On one

occasion Clarke happened to purchase a quantity of valuable goods, which he easily obtained on credit; but, to the surprise of everybody, he soon after disappeared, and no trace of him could be discovered. Suspicion lighted upon A., not as Clarke's murderer, but as his confederate in swindling the public. His garden was searched, and in it was found a portion of the goods which Clarke had purchased. A. was arrested and tried, but acquitted for want of evidence. He now left his wife at Knaresborough, and went to London, and other parts of England, in his capacity of schoolmaster; and, in spite of his nomadic mode of life, contrived to acquire a knowledge of botany, heraldry, Chaldee, Arabic, Welsh, and Irish, and was planning a great etymological work, to be entitled *A Comparative Lexicon of the English, Latin, Greek, Hebrew, and Celtic Languages*, when he was suddenly dragged away from his ushership of Lynn Academy, in Norfolk, and committed to prison on a charge of murder.

The circumstances of the remaining portion of the story are pretty well known. In 1759, a skeleton was dug up near Knaresborough, which the inhabitants suspected to be that of Clarke, for they had now come to the conclusion that the unfortunate man had met with foul play, especially as A.'s wife had, on several occasions, made strange statements to the effect that her husband and a man named Houseman knew more of Clarke's disappearance than they chose to admit. Houseman was now confronted with a bone of the skeleton which had been discovered. He very emphatically denied that it was Clarke's. People naturally wondered how he *could* be so positive, the bones of skeletons being, to the uneducated eye, so similar in appearance. They became convinced that if the skeleton was not Clarke's, Houseman must know where the latter was. At last he confessed that he had been a spectator of the murder of Clarke by A. and one Terry. He named the place where the body had been hidden. It was searched, the buried skeleton was dug up, and A. was tried at York, for the murder of Clarke, on the 3d Aug., 1759. What has given so extraordinary an *éclat* to this trial, is the fact that A. conducted his own defense. He attacked, with great acumen, plausibility, and curious erudition, the doctrine of circumstantial evidence; but to no effect, for a verdict of guilty was returned, and he was condemned to be executed three days afterwards. In the interval, he confessed his guilt to the clergymen who attended him. While in the condemned cell he wrote a defense of suicide; but failed in a practical illustration of the doctrine, which he attempted. The story forms the subject of a novel by Bulwer.

ARAMÆA (from the Hebrew word *Aram*, signifying the highland in opposition to the lowland of Canaan) includes the whole of the country situated to the n.e. of Palestine. Its boundaries, though not rigorously defined, were as follows: N., by Mt. Taurus; e., by the Tigris; s., by Arabia; and w., by Arabia, Phœnicia, and Lebanon. It embraced the countries known to the Greeks by the various names of Syria, Babylonia, and Mesopotamia. The *Aramaic language*, a branch of the Semitic, was common to the whole country, and was divided into two principal dialects—the west Aramaic or Syriac, and the east Aramaic, or, as it is improperly termed, the Chaldee. The former was that spoken almost universally in Palestine in the time of Christ. Ever since the Babylonian captivity, the pure Hebrew, in which the whole of the Old Testament, with the exception of a few chapters in Daniel and Ezra, had been written, had gradually given place to the Aramaic. The Aramaic version of the Bible was that used in Christ's time, who quotes from it, and not from the original Hebrew; as, for instance, the beginning of the 22d Psalm, which he repeats on the cross. The Talmud, especially the Babylonian, has a large admixture of Aramaic elements. The Aramaic dialect is, in general, the harshest, poorest, and least elaborate of all the Semitic languages, and has now almost entirely died out, and given place to the Arabic and Persian. Indeed, it is only found living among some tribes in remote districts of the mountains of Kurdistan, and in two or three villages in Syria; yet it is considered highly probable that it is the root of the whole cluster of Semitic tongues.

ARAMAIC. *Arām*, is the name of a part of the north Semitic family, inhabiting from time to time, but never with one definite centre, various districts within the tract of land bounded by the coast line of Syria and Palestine on the west, the Taurus range and Armenia on the north, the Tigris on the east, and central Arabia on the south. The name, which is referred by tradition to one of the sons of Shem (Gen. x, 22) designates a racial and linguistic, rather than a political unity. From the Egyptian monuments we learn that as early as 1500 B.C. Syria had a well-developed civilization. But the inhabitants were probably the non-Semitic Hittites. The Aramæans dwelt to the east of the Hittites, and gradually drove them farther to the west. On the cuneiform inscriptions they are mentioned (*arimu*, *aramu*, *arumu*) as having settlements in Assyria by Tiglath Pileser I. (1120-1100 B.C.), Shalmanassar II. (860-824 B.C.), and as dwelling in Babylonia by Tiglath Pileser II. (745-727 B.C.), Sargon (722-705 B.C.) and Sennacherib (705-681 B.C.). Homer is thought to mention them as the Ἐρεμβοί or Ἀριμοί (Od. δ. 84, Il. B. 783). By the Greeks they were called Σύριοι, a shortened form of Ἀσσυριοί, which name was accepted by the later Christian Aramæans, as the word *Aramaean* was used in Jewish literature in the sense of "Gentile, heathen." The Aramæans were probably divided into small principalities, whose rulers are called in the cuneiform literature "princes," and not "kings." Of these principalities the Bible mentions: i. *Ārām Naharāim* (Egypt., *Naharina*; Assyr., *Māmi Armāya*), the district between the rivers

Euphrates and Chaboras, and, therefore, not equivalent to the Greek *Μεσοποταμία*; ii., *Ārām Dāmēshēq*, the territory around Damascus; iii., *Ārām Sōbāh*, in the Haurān; iv., *Ārām Beth Rēchōbbh*, probably in the northern part of Galilee; v., *Ārām Māūchāh*, the territory around Mount Hermon. From the banks of the lower Tigris, where in Sāsānian times the district was still called *Bēth Armāyē* (Home of the Aramæans), Aramæan influence spread northward and westward, until it dominated, as a social and linguistic force, Mesopotamia, Syria, and Palestine. The Aramæans seem to have been the chief inland traders of that region: the route from Egypt and the Mediterranean to the valley of the Tigris lying in the lands they inhabited. This influence was felt even in northern Arabia. Aramaic inscriptions have been found at Taima; and the Nabatæans, an Arab race, made use of an Aramæan script and language. When the Jews returned from the Babylonian captivity, they found Aramæan to be the language of Palestine; and in this tongue Jews and the apostles conversed. At an earlier time (8th century B.C.) Aramæan seems to have been the *lingua franca* for that part of Asia (cf. 2. Kings, xviii. 26; Isaiah xxxvi. 11). In the Persian period, it became the official language of the provinces east of the Euphrates; and Pahlavi has retained many Aramæan words, which, however, are pronounced as their Persian equivalents. One of its dialects, Syriac, became the official language of the Eastern Church of Syria and Mesopotamia. The Aramæan script, derived from the older Phœnician, became the parent of the "sacred scripts of the five great faiths of Asia: Zoroastrianism, Judaism, Christianity, Northern Buddhism, and Islam." With the rise of Mohammedanism, Aramæan influence commenced to wane definitely; and in the tenth and eleventh centuries, A.D., even Syriac died out as a living tongue—though still spoken by small communities in the Lebanon, Mesopotamia, and around Lake Urmia.

The Aramæan dialects are divided into an Eastern and a Western branch, of which we have the following literary remains: A. EASTERN ARAMAIC.—i. The Syriac of Edessa, the most important of all the Aramæan dialects, has a very large and valuable literature, consisting chiefly of religious works and translations from the Greek.—ii. The Talmūd of Babylon.—iii. The writings of the Mandæans (so-called "Brothers of St. John") with a script of their own. A small number still exist in Wāsīt, Basra, and Chūzistān.—iv. The modern Aramaic dialects of Tūr Abdīn, Urmia, Salamis, etc. B. WESTERN ARAMAIC.—i. The Aramaic portions of the Old Testament (two words in Gen. xxxi. 47; Jer. x. 11; Daniel xi. 4 b—vii. 28; Ezra iv. 8; vi. 18; vii. 12–26). Through a mistaken application of Daniel ii. 4 a, this dialect has been called "Chaldæan."—ii. Various words and sentences in the New Testament (Mark xiv. 36; Matthew x. 25; John v. 2; Matthew xxvii. 46; Mark xv. 34; 1 Cor. xvi. 22) and Josephus.—iii. The Targūmim, or Aramaic translations of the Old Testament.—iv. The Samaritan Targūm of the Pentateuch and the later Samaritan ritual.—v. The Talmūd of Jerusalem.—vi. The Aramaic inscriptions found in Assyria, in Arabia, and on Papyri in Egypt.—vii. The numerous inscriptions (mostly bilingual) found in the ruins of Palmyra.—viii. Nabatæan inscriptions and coins found in the Sinai-peninsula, Idumæa, Haurān, etc.—ix. The so-called Christian-Aramaic dialect of Palestine as seen in a MS. of the Gospels and in other fragmentary MSS.—x. Remains of a modern Aramaic dialect spoken in Ma'lūlā and some other places in the Anti-Lebanon. See SEMITIC LANGUAGES.

ARANDA, PEDRO PABLO ABARCA DE BOLEA, Count of, b. in 1718 of a distinguished Aragonese family, at first embraced a military career; but having evinced a remarkable spirit of observation, he was appointed by Charles III. ambassador to the court of Augustus III., king of Poland; which post he filled for seven years. After his return, he was appointed captain-general of Valencia, and in 1766 recalled to Madrid on account of its disturbed state, and the presidency of the council of Castile was bestowed on him. A. not only soon restored order in the capital, but limited the power of the inquisition, procured the expulsion of the Jesuits from Spain, and carried the salutary terror of government into the recesses of the Sierra Morena, then infested by hordes of ferocious banditti. Like many other reformers, he was not able fully to carry out his liberal intentions. In 1773, he was removed from his high position through the influence of the clergy, the Dominican monks especially, and sent as ambassador to France. Grimaldi succeeded him in his office, and after him Count Florida Blanca; but when the latter lost his office in consequence of court intrigues, A. returned to his position; soon, however, to lose it again through the agency of Godoy, duke of Alcudia, the queen's favorite. He, however, still remained president of the council of state, which he had organized; but upon expressing his views regarding the war with France, he was banished to his native province of Aragon, where he d. in 1799.

ARA'NEA and **ARANE'IDE**. See SPIDER.

ARANEIDES. See SPIDER.

ARANEIFORM. A name applied to any insect having the form of a spider (q.v.).

ARANGO. The native African name for a bead of rough carnelian (q.v.) much used as ornaments by the natives of the East Coast, and made for the African trade in Bombay.

ARANJUEZ (a corruption of the Latin *Ara-Jovis*, altar of Jupiter), a t. in the province of Madrid, Spain. It is situated on the left bank of the Tagus, 28 m. s.s.e. from Madrid, in a beautifully wooded valley, and is now connected with the Spanish metropolis by a railway. The t. is built in the Dutch style, has broad and regular streets intersecting each other at right angles, and a pop. of 9600. It is famed for its palace and gardens. The former was long a favorite resort in spring of the royal family, during which period A. occasionally reckoned as many as 20,000 inhabitants; the latter were laid out by Philip II., who built a palace also, for there was only a shooting villa here during his father's time, but a fire destroyed a portion of it, and more was taken down by Philip V., who reconstructed the edifice in French style. The present château was completed by Charles IV. On account of its gardens, the natives call A. "the metropolis of Flora." These gardens are interspersed with numerous summer-houses, the most celebrated of which is the *casa del labrador*, or laborer's cottage; but their most splendid ornaments are the great elm-trees brought from England by Philip II., which thrive magnificently. They radiate out from a central plot in 12 distinct rows. A. is known historically for the treaty of alliance concluded here between France and Spain on April 12, 1772, and as the scene of the abdication of Charles IV. on March 18, 1808.

ARANSAS, a co. in Texas, on the Gulf of Texas. Area, 400 sq.m.; pop. '90, 1824. Co. seat, Rockport.

ARANY, JANOS, next to Petöfi the most distinguished of modern Hungarian poets, was b. at Nagy-Szalonta in 1817. His father was a poor peasant, who spared no pains to get him into the church. In 1832, he entered the college at Debreczin, where he distinguished himself by his diligence; but unable to restrain his love of adventure, he joined, in 1836, a company of strolling-players, with whom he traveled about for several months, till, driven by necessity and an upbraiding conscience, he hurried home to do what he could for the support of a now blind and aged parent. At Szalonta he worked as a teacher of Latin and as a notary. When the Kisfaludy Society of Pesth offered a prize for the best humorous poem, A. sent in anonymously his *Az elveszett Alkotmány* (The Lost Constitution of the Past). He was successful. Thus emboldened, he ventured, in 1847, to forward to the same society the first part of a trilogy, *Toldi*. Struck by the beauty of this purely national effort, the members published it at their own expense, and again rewarded the author. A. soon became a popular favorite, even in the lowest ranks of the community. In 1848 appeared his *Murányi Ostroma* (Conquest of Murány), which received less attention owing to the political excitement of the time. The poet himself took a slight part in the revolution, but after the dismal termination of the war, he was allowed to return to his country. Soon afterwards he became professor of Hungarian literature at Nagy-Koros, and then director of the Kisfaludy society, and editor of the journal *Koszorú*. The chief of his later works are *Katalin*, the second part of *Toldi*, 2 vols. of lyrics, the first part of another trilogy, *Buda Halála*, and a humorous poem recounting his early adventures (1874). Some of his works have been translated into German. He d. 1882.

ARAP'AHOE, a co. in n.e. Colorado; 5220 sq.m.; pop. in '80, 38,607; in '90, 132,135. The Kansas Pacific railroad passes through, and the co. is watered by the branches of the s. fork of the Platte. The w. part is mountainous, the e. level. Mining and agriculture are the industries. Co. seat, Denver, which is also the capital of the state.

ARAP'AHOE, a co. in s.w. Kansas, formed in 1873; 576 sq.m.; unorganized.

ARAP'AHOES, an Indian tribe, dwelling on reservations in Wyoming and in the Indian territory, allied by language to the Caddoes. A powerful tribe half a century ago, they are now few in number and inoffensive. The French called them "Gros Ventres."

ARAPAIMA, a genus of fresh-water fishes, the largest known fresh-water fishes in the world. They are found in the rivers of South America, and are sometimes taken in the Rio Negro 15 ft. in length, and of the weight of 4 cwt. They are taken with the harpoon, and are highly esteemed for food, both fresh and salted. In the salted state they have begun to form an article of commerce, and are conveyed in large quantities to Para. The genus *A.* belongs to the family of *clupeosidae*, a family of malacopterous fishes, allied to the *clupeidae* or herring family, and is remarkable for the mosaic work of strong, bony, compound scales with which the body is covered. About six species are known.

ARARAT (Airarat, in the old Armenian dialect; i.e., the plains of the Aryans), the ancient name of the fertile plateau through which flows the river Aras or Araxes. It occupies the centre of the mountainous region of Armenia, belonging partly to Turkey and partly to Russia. Notwithstanding the passage in Gen. viii. 4, where it is said that the ark rested "on the mountains of Ararat," it has become common to give the name *A.*, not to the entire range, but to the mountain called by the Armenians *Massis Leusar*—i.e., "mountain of the ark" (known among the Turks as *Aghri-Dagh*, "steep mountain;" and among the Persians as *Koh-i-Nüh*, "Noah's mountain"). It rises in two volcanic cones, known as the greater and the lesser Ararat; the former, which attains the height of 17,212 ft. above the level of the sea, is covered with perpetual snow. It

is the highest elevation of western Asia; and since the war of 1827 it forms the point where the Russian, Turkish, and Persian territories meet. In 1840, the form of the mountain was partially changed by a frightful and destructive earthquake. Previous to this period, at the base of the mountain, and at a point where a stream runs from a wild gorge, there stood the village of Arguri or Aguri. It was surrounded by gardens and orchards, and inhabited by upwards of 1600 inhabitants. In the ravine, 2300 ft. above the village, stood the Armenian convent of St. James; and 1000 ft. higher still, a chapel dedicated to St. James. The beauty and mild air of the district made Arguri a favorite summer resort of the richer inhabitants of Erivan. It was to undergo a great change, however. On the 20th of June, 1840, dreadful shocks of earthquake were felt. Great masses of the mountain were thrown into the plain, the ravine was closed, the convent and chapel disappeared, and the village, and the gardens which surrounded it, were buried under rocks, earth, and ice, and with the inhabitants utterly destroyed. Tournefort made a partial ascent of the mountain in 1700; since then, ascents have been made in 1829 by Prof. Parrot, of Dorpat, and his companions; in 1850 by Col. Chodzko, and a large party of Russians engaged in the transcaucasian triangulation; in 1856 by Major Robert Stuart; and in 1870 by Dr. G. Radde and Dr. G. Sievers. These naturalists, the former of whom is director of the museum at Tiflis, have carefully explored the mountain and district in which it is situated. See their "Reisen in Armenschen Hochland" (*Petermann's Mittheilungen* for 1871); also the *Transcaucasia* and A. of Mr. Bryce, who made the ascent in 1876.

A'RAS, the ancient *Araxes*, a river of Armenia, formed by the junction of the Bingol-Su and the Kaleb-Su, and uniting its waters with those of the Kur (ancient *Cyrus*) after a course of about 500 miles. The main stream is the Bingol-Su, which rises in the Bingol-Tagh, in lat. $41^{\circ} 30' N.$, and long. $41^{\circ} 10' E.$; and flowing n.n.e., is joined a little below Hasan-kaleb by the Kaleb-Su, after which the combined stream is called the A. It then flows eastward, forming for some time the southern boundary of the province of Kars, till it is joined by the Arpa, which flows into it from the n. After this, it divides Russian and Turkish Armenia; at some distance to the s. of Erivan it turns to the s.e., along the base of Ararat; soon after which it receives the waters of the Zenghi, a river descending southward past Erivan. Near Djulfa it runs eastward for about 60 m.; after which it runs to the n.e. for upwards of 125 m., till it is joined by the large river Kur, descending from the Caucasus through Georgia. Their united waters, after a short eastward course, turn suddenly to the s., and fall by three mouths into the gulf of Kizilgatch, in the Caspian, in lat. $39^{\circ} 20' N.$

ARA'TUS of SICYON, a distinguished Greek statesman, was b. about 271 B.C. His youth fell among the party strifes of his native t., in which his father, Clinias, met his death; and he himself was only saved by the efforts of his aunt, who had him secretly conveyed to Argos, whence he returned, in his 20th year, and liberated Sicyon from its tyrant, Nicocles, 251 B.C. Supported by Ptolemæus Philadelphus, A. restored the republican form of government to Sicyon, and united it with the Achaian league, of which he was appointed general, 245 B.C. During his honorable but checkered career, this office was conferred on him 17 times. His great object was to unite the Greek states, and form out of them an independent nation; but this was thwarted by their mutual jealousies. A. was a brave general, a skillful tactician, and a disinterested patriot. He died by poison administered to him by command of Philip III. of Macedon.

ARA'TUS of SOLI (or Pompeiopolis, in Cilicia), wrote about 270 B.C., a Greek didactic poem entitled *Phænomena*, founded on the astronomical system of Eudoxos of Cnidos, and appended to it another poem, *Diosmeia*, giving rules for prognostication of the weather. A pure style and correct versification mark both poems, which were translated into Latin by Cicero, Cæsar Germanicus, and Rufus Festus Avienus. A. was a native of the same province as St. Paul, who quotes from him in his speech on Mars' Hill: "For as certain of your own poets have said, We also are his offspring." The best edition is that by Buhle, 2 vols. Leipsic, 1793-1801.

ARAUCANIA, the country of the Araucos or Araucanian Indians, in the s. of Chili. The Chilian province of Arauco, lying between the rivers Biobio and Valdivia, was incorporated in 1852. The Indians occupy a large territory in Arauco and the more southerly province of Valdivia, and have of late mostly submitted to the Chilian republic. The Araucanians are interesting as furnishing the only example of Indian self-government in the presence of the European races. Their country is divided from n. to s. into four parallel regions, varying from each other, with tolerable regularity, in soil and climate. These are the coast region, the plain region, the region of the lower Andes, and the region of the higher Andes. The productions of A. are similar to those of Chili. The population cannot be accurately estimated on account of the independence of the nation; but the official estimates for 1894 set down the aboriginal population of Chili at about 50,000 souls.

A. has the proud distinction of being the only portion of the new world that has never received the European yoke. From the days of Pizarro and Almagro downwards, it has uniformly vindicated its freedom—its wars of independence having lasted, with intervals of precarious truce, from 1537 to 1773. During the war between Spain and the Chilian colonists, A. remained neutral. In 1861, a French

adventurer named De Tonneins was elected king of A., but was dispossessed and died in 1878.

ARAUCA'RIA, a genus of plants of the natural order *coniferae* (q.v.) or pines, consisting of lofty trees, natives of the southern hemisphere, and distinguished by having the male and female flowers on separate plants, the pollen of the male flowers contained in 10—20 cases pendent from the apex of each scale, the female flowers two under each scale; each having one ovule. The species are all evergreen, the leaves broader than in pines and firs, which, however, the trees resemble in their general manner of growth. *A. imbricata*, sometimes called the CHILI PINE, a native of the Andes of Chili, forming forests on their western declivities, attains a height of 150 ft., the trunk quite straight and free from knots. The bark of the young trees is studded with leaves from the base upwards, even until 12 or 15 years of age. The branches are in whorls of 6, 7, or 8. Young trees have branches almost from the ground; old trees have tall naked stems, with a crown of branches. The female strobile (cone) is roundish ovate, 8 to 10 in. in diameter, the scales terminated by a long awl-shaped point, the seeds wedge-shaped, and more than an inch in length. The outer and inner bark of full-grown trees are each 4 to 6 in. in thickness; the outer bark of a cork-like texture; the inner, fungous and porous. From both outer and inner bark, and indeed from all parts of the tree, resin flows readily and in great abundance. The leaves are lanceolate, about $1\frac{1}{2}$ in. in length, and $\frac{1}{2}$ in. in breadth near the base, sharp-pointed. The timber is heavy, solid, hard, fibrous, yellowish white, and beautifully veined. It is very suitable for masts of ships. The resin, which is white, has a smell like frankincense, and a not unpleasant taste. It is applied as a plaster to contusions. The seed is pleasant to the taste, not unlike the chestnut, and is a most important article of food to the Indians. It is eaten raw, boiled, or roasted. A spirituous liquor is also distilled from it. A single strobile sometimes contains between 200 and 300 seeds, and one tree may be seen loaded with 20 or 30 of these great strobiles. This *A.* was introduced into Britain in the end of last century, and is now pretty frequently planted. It promises to add a new feature to British landscapes, as other trees of the same order, particularly the larch and spruce (see illustration, *CONIFERÆ*, vol. IV., figs. 1, 4, 6), have done before, and will probably prove important in an economical point of view. *A. brasiliana*, the BRAZIL PINE, has loosely imbricated lanceolate leaves, and a looser and more spreading habit than *A. imbricata*. The seeds or nuts are sold as an article of food in Rio Janeiro. The resin which exudes from the tree is mixed with wax to make candles. *A. excelsa*, now called *eutassa excelsa* (and by some *atlingia*), the NORFOLK ISLAND PINE, a native of Norfolk island, New Caledonia, etc., attains a height of 160 to 220 ft., free from branches to 80 to 100 ft., and with a trunk sometimes 11 ft. in diameter. The wood is white, tough, close-grained, and so heavy as almost to sink in water. The leaves of the young trees are linear and spreading; those of the adult are ovate, and closely imbricated. The strobiles are ovate, 4 to 5 in. in length. *A. cunninghamii*, now also ranked in the new genus *eutassa* or *atlingia*, the MORETON BAY PINE, a native of the shores of Moreton bay and banks of the Brisbane river in New South Wales, very much resembles the last. It attains a height of 60 to 130 ft., and a diameter of 4 to 8 ft. The leaves of the adult trees are lanceolate and imbricated. The wood is yellowish, and is used for boat-building, house-carpentry, and the common kinds of furniture. The large seeds of *A. bidwillii* are used for food by the natives at Moreton bay.

Certain fossil *coniferae* found in carboniferous sandstone have received the name *araucarites*. Livingstone found a forest of large silicified trees near the Zambesi, which Mr. Quekett, on examination of specimens, ascertained to be "silicified coniferous wood of the Araucarian type." Fossil trees of the same type occur in the carboniferous strata of Britain. A trunk, for instance, 47 ft. long, was found in Craighleith quarry, near Edinburgh, in 1830.

ARAU'CO, a province in s. Chili between the Andes and the Pacific ocean; area, 13,714 sq.m.; pop. (est.) '94, 92,524. The chief t. is of the same name, on a bay of the same name, about 300 m. s. of Valparaiso.

ARAUJO, DE AZEVEDO, ANTONIO DE, afterwards count da Barca, was b. at Sá, in the neighborhood of Ponte de Lima, in Portugal, on the 14th of May, 1754. At the age of 11, he was sent to Oporto to study under his uncle, who held a high military command there. In 1787 he was appointed Portuguese ambassador to the Hague. Before entering on his duties, he visited England, where he omitted no opportunity of obtaining a knowledge of English manufactures, commerce, politics, etc. He next proceeded to Paris, where he similarly employed himself. Soon after his arrival at the Hague, he found himself entangled in political difficulties. The French revolution had broken out, but the part which he played in the complication of political affairs which ensued falls to be treated more properly under the history of Portugal (q.v.).

At length he threw up his ambassadorship, and traveled through Germany, enlarging the sphere of his studies. He paid especial attention to mineralogy and chemistry, and was fortunate enough to become acquainted with Goethe, Wieland, Schiller, Herder, etc. After the peace of Amiens, A. was sent as ambassador to St. Petersburg; in 1803 he was recalled to Lisbon, to assume the office of secretary of state; and in 1806 he obtained the

highest political dignity in the kingdom. His efforts to introduce the various agencies of civilization, while he occupied this situation, were unremitting. Glass, paper, wool, and cotton manufactures received liberal encouragement. But the sudden approach of the French army put an end to all his improvements. The royal family, which Bonaparte had formally dethroned in his victorious proclamation, emigrated to Brazil. A. embarked also, taking along with him a complete printing apparatus, his mineralogical collection, arranged by Werner, and all necessary chemical instruments. During the first years of his residence in the new world, he devoted himself assiduously to scientific and literary pursuits; founded a school of medicine and chemistry, introduced the cultivation of tea, an improved machine for sawing wood, and a sugar-alembic, and established a porcelain manufactory. He had also a magnificent garden, the plants of which were scientifically arranged. He died on the 21st June, 1817.

ARAU RÉ, a t. of Venezuela, South America. It is situated in lat. $9^{\circ} 17' \text{ n.}$, long. $69^{\circ} 28' \text{ w.}$, 60 m. e.n.e. of Trujillo, in a region noted for its fertility in the production of cotton, coffee, cattle, etc. The t. itself is rather handsome. Population about 4000. Some estimates place it at 10,000.

ARAVUL'LI, a range of mountains in western India, extending from about $22^{\circ} 40' \text{ n.}$ lat., 74° e. long., to $26^{\circ} 50' \text{ n.}$ lat., 75° e. long. The highest summit is Abu (q.v.). The north-eastern extremity of the range sinks into comparatively low rocky hills. The north-western side is very bold and precipitous, the south-eastern less so. There is no road practicable for wheel-carriages across this range for a distance of 220 miles.

ARAXES. See ARAS.

AR BACES, one of the generals of Sardanapalus, and the founder, 876 B.C., of the Median empire. In conspiracy with a Chaldean priest who commanded the troops from Babylon, he revolted, gained the assistance of several prominent officers, and defeated Sardanapalus, who committed suicide. The dynasty of A. lasted until 559 B.C., when Cyrus overthrew it.

AR BALEST, **ARC'BALEST**, or **CROSS-BOW**, was a weapon much in use during the feudal times. Its recognized position among military arms may be dated from about the period of Richard I. The smaller kinds of A. were bent by pressing the hand on a small steel lever called the "goat's foot;" but the larger kinds were bent by placing the foot in a loop or stirrup at the end of the central shaft, and drawing the cord upwards with the hand. At a later period, the bow was made very strong, often of steel; in this form it required a mechanical contrivance, called a "moulinet," to bend it. Sometimes ordinary arrows were used with the A., but more usually arrows of a shorter and stouter kind, called "carrials" or "quarrels," were employed; these had a four-sided pyramidal form of head. Occasionally stones and leaden balls were shot from the larger arbalests. The arbalesters, or cross-bowmen, carried a quiver with 50 arrows as an armament in some of the battles of the 13th century. They were an essential component of armies of that period, taking up their position in the van of the battle array; some were mounted, some on foot, and they occasionally wore armor. The supply of arrows or quarrels was carried after them to the battle-field in carts. The A. continued to be a favorite weapon in England throughout the 13th c.; but in the 14th it gave way to the long-bow, which was found to be a more convenient weapon in battle. Further information concerning the long-bow and the general military system to which it belonged is given under **ARCHERS** and **ARCHERY**.

ARBALESTI'NA, in the military system of the middle ages, was a small window or wicket through which the cross-bowmen shot their quarrels or arrows at an enemy besieging a fortified place.

ARBĒ'LA, now Erbil or Arbil, a small t. of Assyria, e. from Mossul, famous as having given name to the battle in which Alexander finally defeated Darius, 331 B.C. The battle was really fought near Guagamela (the "camel's house"), to the n.w. of A.

ARBITRAGE, comparing and settling accounts, and arranging disputes, applied both to a calculation and to a trade. As to calculation, A. relates to the simultaneous values at any particular moment of any specified merchandise in one market in terms of the quotations on one or more markets, exchange considered. As to trade, A. relates to the business, founded on such calculations, of buying or selling wholesale in the cheapest market for the time being, and simultaneously re-selling or buying. A. proper is a distinct and well-defined business, with three main branches, viz.: A. in bullion or coin, in bills and exchanges, and in shares or stocks.

ARBITRATION is the adjudication by private persons appointed to decide a matter, or matters in controversy, on a reference made to them for that purpose, either by agreement of the disputants or by the order, or on the suggestion, of a court of law. The proceeding generally is called a *submission to arbitration*, or *reference*; the parties appointed to decide are termed *arbitrators*, or *referees*; and their adjudication is called an *award*. This mode of settling disputes is not only frequently resorted to by litigants themselves, who are anxious to avoid the delay and expense of proceedings in the public tribunals, but the statute-book bears witness to the approval of it by the legislature at various times,

The matters that may be determined by an arbitrator are all personal disputes and differences which might otherwise be made the subject of controversy in the courts of civil jurisdiction. Thus breaches of contracts generally, breaches of promises of marriage, trespass, assaults, charges of slander, differences respecting partnership transactions or the purchase price of property, and questions relating to tolls or the right to tithes, may all be referred to A. Questions relating to real property may also be referred, such as those relating to the partition of lands of joint tenants or tenants in common, to settlements of disputed boundaries—to differences between landlord and tenant respecting waste—and to the title to land. Pure questions of law may also be referred to the decision of an arbitrator. An arbitrator may have, therefore, to determine the liability of a party on a promissory note or bill of exchange, or to construe an act of parliament, or to give a judicial opinion on the effect of a will or deed. Actions at law, and suits in equity, may also be settled by A.; and this kind of reference may be made at any stage of the proceedings, sometimes even after verdict, and probably by analogy, after decree in equity. Questions relating to the future use and enjoyment of property, and future or anticipated differences between parties, may likewise be referred.

A matter, however clearly illegal, cannot be made the subject of a valid reference. But where transactions between parties have been brought to a close by a general award, apparently good, the courts have refused to reopen them on a suggestion that some legal item has been admitted in account.

Among the questions that cannot be referred to A., are matters arising out of the administration of the criminal law in the case of felonies and relating to agreements or transactions against public policy. Felonies and offenses of a public nature cannot be referred, because the public safety and good require them to be punished, and for this purpose they can only be properly tried in one of the ordinary courts of the country.

With respect to matters which cannot be referred on account of their being against public policy, the rule is so obviously just that no illustration is required.

But there are certain misdemeanors which may be either settled by agreement or by means of an A., on a principle of very general application stated by chief-justice Gibbs—that where there is a remedy, by action as well as by indictment, a reference of the matter in controversy is good. And in these cases of misdemeanor, a compromise or settlement under a reference may be made, even after conviction, but with the sanction of the court.

Respecting the powers of infants or persons under age to submit to A., there are numerous decisions in the courts of law and equity; but they go upon refinements and nice distinctions more suited for the professional lawyer than for the ordinary reader, and we therefore do not think it necessary to give any explanation of them in a popular article such as this professes to be.

Partners and corporations may make references to A. on the principles already explained, and according to the relation in which they stand to the matter in dispute.

Submissions to reference may also be made by executors and administrators, by trustees, by the committee of a lunatic, and by the officer of a public company, who is authorized by a statute to sue and be sued in the name of the company. And there are persons especially empowered to refer by the statutes which we have already enumerated.

The arbitrator ought to be a person who stands perfectly indifferent between the disputants; but there are no other particular qualifications for the office. And the choice by parties of the person who they agree shall decide between them, is perfectly free. Some legal writers have even gone so far as to maintain, that not only infants and married women, but even idiots and lunatics, can be arbitrators, on the argument that every person is at liberty to choose whom he likes best for his private judge, and he cannot afterwards object to the deficiencies of those whom he has himself selected. But this, it is clear, is going too far, and the policy of the law would certainly be interposed against such extreme cases. It is better to state the rule to be, that on the condition that the party selected is of ordinary intelligence, the choice of an arbitrator is absolutely unfettered. The only exception to this rule is the case of a party who, by office or position, is the person pointed out for the duty under a reference made by statute. In matters of complicated accounts, mercantile men are generally preferred. In other cases, it is usual to appoint barristers who, being accustomed to judicial investigations, are able to estimate the evidence properly, to confine the examination strictly to the points in question, and, in making the award, to avoid those informalities in respect of which it might afterwards be set aside. Both time and expense are thus saved by fixing on a professional arbitrator. It has, indeed, been wisely remarked, that an arbitrator should endeavor to arrive at his conclusions upon the same rules and principles which would have actuated the court for which he is substituted—a rule of conduct that obviously points to the expediency of a lawyer being the referee. But an arbitrator is not bound by the mere rules of practice which prevail in the ordinary courts of justice, and he has been held justified in allowing interest on both sides of an unliquidated account, although such a determination was against the practice of the court of chancery, where the suit, which had been referred, had been commenced.

The proceedings before an arbitrator are regulated according to the peculiar circumstances of the case submitted, but generally it is advisable to conduct them according to the forms observed in courts of law, and they usually are so conducted. Each of the

parties furnishes the arbitrator with a statement of his case, which is done by giving him a copy of the briefs on each side; and on the day appointed he proceeds to hear them (either in person or by their counsel or attorneys), and to receive the evidence on each side, nearly in the same manner as a judge at an ordinary trial. Having so heard the case, the arbitrator proceeds to make his award, which need not necessarily be in writing, for a verbal award is perfectly valid; but in practice it is usual for the arbitrator to make his award on paper stamped with the proper award stamp, and this he delivers to the successful party. The unsuccessful party gets a copy of the award on unstamped paper. This award in its effect operates as a final and conclusive judgment respecting all the matters submitted, and it binds the rights of the parties for all time.

An award may be set aside on the ground of corruption and fraud in the arbitrator, and for any material irregularity or illegality appearing on the face of the proceedings. But the tendency of the courts is to favor arbitrations and maintain awards, unless such serious grounds as we have referred to can be substantiated.

Where there are two arbitrators, the submission often provides that in the case of their differing in opinion the matter referred shall be decided by a third person, called an umpire, who is generally appointed under a power to that effect, by the arbitrators themselves. But they cannot make such an appointment unless specially authorized so to do by the terms of the submission. This umpire rehears the case, and for this purpose is invested with the same powers as those possessed by the arbitrators, and bound by the same rules.

In the United States arbitration is under very much the same laws as in England, but some recent decisions are noteworthy. The New York court of appeals holds as void an article in the constitution of a private society, which made certain members a court to judge of violations of the rules, with power to forfeit the offender's rights in property; regular courts would not enforce the decision of tribunals organized by private agreement, except where the person affected expressly agreed to submit the matter in dispute to A. Some states exclude certain matters from A. as in New York, where claims to life estates, whether in fee or in realty, cannot be submitted, the object of the law being to preclude from unlearned arbitrators questions depending upon strictly technical points. The old rule that married women could not enter into A., is practically obsolete, as most of the states have recently enacted laws which put women nearly on the plane with men in the holding and disposition of property. The question, whether one partner in business can bind another in an agreement to arbitrate, is not definitely settled, but the drift of authority is against such power, though it is held that the contracting partner is bound, and the partner's refusal to fulfill the award may cost the contractor in damages. Forms of agreement are unimportant, and may be merely verbal without written documents; and the omission of an arbitrator to be sworn is held as only an irregularity. Hearings in A. must be on notice to both sides; where *ex-parte* they are void. If there is to be an umpire he must be chosen before the hearing. All the arbitrators must agree in the award, unless other provision is specially made, and awards must be specially conclusive and final. All states have laws provided for setting aside or overruling the decisions of arbitrators for partiality, fraud, or any misconduct, on appeal to a regular court; and courts may correct mistakes or other imperfections in awards. Some states provide that awards may be vacated for any legal defect. In a few states, laws provide that neither party shall revoke his submission to A. without consent of the other; some provide that no revocation shall ensue after the case has been submitted to the arbitrators upon evidence; in some states the rules are less stringent, and a party may revoke his consent at any time, incurring only the accrued costs, but this seldom happens. Submission to A. suspends the right of suing on the pending cause of action, and a legal award bars the right of suit altogether. If awards are honest and fair, the courts will not vacate them because of mere errors of statement. Justice Story gives decision that arbitrators may make their judgment on the principles of equity and conscience rather than on legal technicalities. In Pennsylvania, a party in a civil action may compel the submission of it to A., with or without the consent of the other party. In New York city there is a "board of brokers" in whose articles of association is a section providing for A. in certain cases. The courts have held that this section is nothing more than an agreement in general terms to submit, and have declined an application to compel a member to such submission, since his refusal was merely an exercise of his power of revocation. A. in international affairs is of long standing, and growing rapidly in favor. One of the first in American history was the case of the privateer *General Armstrong*, in which the first Napoleon acted as arbitrator. One of the most successful instances of arbitration involving the United States, was the "Geneva award" in settlement of the Alabama claims. (See GENEVA ARBITRATION.) An International Court of Arbitration has often been proposed for deciding disputes between all nations. The United States has always been favorable to international arbitration. In 1891 the government referred to arbitration the solution of the Behring Sea controversy with Great Britain. In 1895, President Cleveland made the refusal of Great Britain to arbitrate with Venezuela the question of the boundary line of British Guiana the subject of a spirited message to Congress, and an act was passed providing for a commission to investigate the claims of the two powers. The members of this commission were appointed in January, 1896, and the inquiry was begun, but before it had prepared its report the British government agreed to submit its claims to a joint commission for arbitration. A treaty between Great Britain and Venezuela to that effect was signed on Feb. 2, 1897, and the commission appointed

by the United States suspended its labors, submitting its final report to the President on Feb. 27, 1897. This report was placed at the disposal of the International Commission, which consisted of Chief Justice Fuller and Justice Brewer of the United States, selected by Venezuela, and Lord Herschell and Justice Collins, chosen by England. In the event of the failure of the commission to agree on a fifth member, King Oscar of Sweden was to name the umpire. On January 11, 1897, a general arbitration treaty between the United States and Great Britain was signed by the British ambassador and the United States secretary of state, but was rejected by the senate in May, 1897. For some account of arbitration in labor disputes, see the article **STRIKES**.

ARBOGA, an ancient city in Sweden, in the province of Westmannland, on a small river of the same name, by which, with the aid of a canal, the lakes Hialmar and Mälär are united. A. used to be an important commercial town, but it has now sunk into insignificance, and only possesses an historical interest from the antiquities in its neighborhood. Of all its churches, cloisters, and chapels there only now remain the town and parish churches, the former with an altar-piece of Rembrandt's. Several kings of the family of Vasa have resided here. Church assemblies were held here in 1396, 1412, 1417, 1423, and 1474; diets in 1435, 1440, 1471, 1529, and 1561, in which last year also certain articles, known as the Arboga articles, were passed by which Eric XIV. was enabled to limit the power of the nobles; and in 1625, Gustavus Adolphus issued an edict here, commanding that the copper coin of the realm should contain its full worth of copper. Pop. about 5000.

ARBOGASTE, LOUIS FRANÇOIS ANTOINE, a French mathematician, was born in 1759 and died in 1803. He was Rector of the University of Strasbourg, and Professor of Mathematics in the Ecole Centrale of that city. In his work entitled *Du Calcul des Derivations* (1800), he was the first to use symbols of operation independently of symbols of quantity. He was a member of the National Convention in 1793.

ARBOIS, a t. in the department of Jura, France, in a deep valley on the Cuisance, 940 ft. above sea-level; famous for its wines, which were exempted from taxation in 1493, by Maximilian I. It has trade also in brandy, grain, oil, fruits, cattle, and cheese, and manufactures of paper and leather. It had once a commandery of the knights of Malta, two monasteries, and three nunneries, and still possesses a college and the ruins of a castle. Pop. 4000 to 5000.

ARBOR. A bower or grove of trees.

ARBOR (in mechanics). An axle on which a wheel revolves.

ARBOR (in botany). A tree as distinguished from a shrub or plant.

ARBOR DAY, a day set apart by the legislatures of the states and territories of the United States for the annual planting of trees by the people, and more especially by school children. It is believed to have been suggested by Julius Sterling Morton, and was recommended by the Nebraska State Board of Agriculture in 1874, and the American Forestry Association. The day, either in April or May, is observed in nearly every state and territory, in some as a legal holiday, in others as a school holiday.

ARBOR DIANÆ. The name given by chemists to a precipitation of silver in a beautiful arborescent form. It is made by putting mercury (q.v.) into a solution of nitrate of silver.

ARBORESCENT (from Lat., *arbor*, a tree), a term applied to plants to signify that they possess either altogether, or in some measure, the character of trees. Even the dwarf willows and birches, on the confines of polar or alpine perpetual snow, are described as the A. vegetation of these regions.

ARBORETUM. A collection of specimen trees in a park or nursery.

ARBORICULTURE (from Lat. *arbor*, a tree), a term literally signifying the cultivation of trees, but in use generally restricted to the planting and management of timber-trees, or employed as exclusive at least of the cultivation of fruit-trees, which is a branch of horticulture or gardening.

The ancients practiced A. to some extent, but chiefly with the view of beautifying their villas, or of forming public walks in the vicinity of cities. It is only for similar purposes, and on a very limited scale, that A. is yet anywhere practiced in America. The planting of timber trees for economical purposes, or with a view to profit, is unnecessary whilst natural forests are abundant, and can scarcely be referred even in Britain to an earlier period than the beginning of the 16th c., nor did it become at all general till a much later date. The early forest laws of England, as of other feudal countries, had reference chiefly to game, for the sake of which it was, and in order to the enjoyment of the chase, that large tracts were depopulated and converted into *forests* by the first Norman kings. Plantations for timber and fuel were, however, certainly made in England in the 16th c.; and the importance of the subject was urged on public attention by authors of that period. In the 17th c., the greatly increased demand for oak, for the building both of ships and of houses, gave a new impulse to A., which attracted more than ever before the attention both of the government and of the great landowners; the publication of Evelyn's *Sylva* also did more than any previous work to

promote a taste for it. It was in this century that nurseries for forest trees were first established. It was not until the beginning of the 18th c. that the first extensive plantations were made in Scotland, nor until towards the end of that century that A. became general in that country or in Ireland. How much the very landscape has been changed by it—how great a difference has been made by the conversion of bleak hills and barren wastes into woods—how much the scene has been changed by the new forms of foreign trees, some of which are now in many districts more abundant than those which are indigenous, it is not easy to imagine; and how much these changes have promoted and are indicative of improvements in agriculture and increased productiveness of fields, is equally difficult to estimate.

The A. of France, Germany, and other parts of Europe, to this day, consists in a great measure of the management of natural forests; and in the more eastern parts of the continent this is almost exclusively the case. Without a careful management of the natural forests, many districts of France and Germany would soon be destitute of fuel; by means of it an increased supply of valuable timber is also obtained; and extensive domains belonging to the state, or to private proprietors, are rendered much more productive. It is in Germany that the management of the forests has received the greatest attention, and has been most systematically and scientifically conducted.

The forest trees of Britain, and of temperate climates generally, are conveniently divided into two classes—the one consisting of coniferous trees or pines and firs (*nadelholz*, i.e., the “needlewood” of the Germans), the other including all other kinds (*laubholz*, i.e., the “leaf-wood” of the Germans); the latter being sometimes subdivided into *hard-wooded trees*, of which the most important in Britain are oak, ash, elm, beech, birch, hornbeam, sycamore, walnut, and chestnut; and *soft-wooded trees*, as willow, poplar, lime, alder, and horse-chestnut. Of these and other trees, of their particular uses, and of the soils and situations to which they are adapted, notice is taken in separate articles.

Plantations are generally formed in Britain by means of trees raised from seed in a nursery; but sometimes also by sowing the seed on the ground intended for the plantation; in which case, if circumstances permit, a crop of grain is often sown along with the seeds of the trees, as these do not in general vegetate very soon; and the young plants derive advantage from the absence of choking weeds when the grain-crop is reaped, and from the protection afforded by the stubble. It has been supposed by some, but there is no sufficient evidence in support of the opinion, that more healthy and vigorous trees are obtained by sowing on the spot than by planting those which have been raised in a nursery. However, only very young trees can be planted with advantage, those which have attained a greater size requiring a degree of attention far beyond what is possible in plantations even of very moderate extent. The time of planting is from November to February. The most approved mode of planting is in small pits, in which the roots are disposed in a natural manner, and which are then carefully filled up with earth; but it is often thought sufficient when the tree to be planted is very young, to make a slit for it with the spade, or two slits, one at right angles to the other in the form of the letter T. Other methods are also adopted, particularly for rocky situations, in which the spade cannot be used. Economy is often a consideration of great importance in determining the mode of planting.

The formation of plantations by the sowing of seed has been more generally practiced on the continent than in Britain. In this way the vacancies in the natural forests of France and Germany are filled up. In this way also great sandy tracts have been covered with wood on the coasts of Pomerania and of France. This has particularly been accomplished on a scale of extraordinary magnitude in the downs of drifting sand, between the rivers Adour and Gironde. The operations there were begun by M. Bremon-tier in 1789, and deserve to be mentioned as perhaps the most important operations in A. that have ever been performed in the world. Vast forests of pinaster now occupy what was originally loose sand destitute of vegetation.

Too little attention has hitherto been generally paid to the adaptation of the kinds of trees that are planted to the soil and climate; and to this cause many failures in A. are to be ascribed. Some trees grow well even in exposed situations, and are fit to be employed in these, either to form entire plantations, or to occupy the outer part, and so to shelter other trees, which in general are not planted until the outer zone or belt of the most hardy kinds is somewhat advanced; some succeed only in rich soils; some are incapable of enduring the sea-breeze; others, as the sycamore, the elder, and the pinaster, are comparatively unaffected by it. Some trees suffer from an amount of moisture from which alders or willows would rather derive advantage; but, in general, the thorough drainage of the land intended for a plantation is one of the circumstances most important to its success.

To the necessity of this thorough drainage we must look as compensating, or more than compensating, the influence which woods exercise in condensing the moisture of the atmosphere, and in rendering a climate cold and damp; marshy soils being in this respect still worse. The shelter afforded by plantations judiciously disposed, whether in belts or otherwise, is also of great importance in rendering them suitable for that improved agriculture in which thorough drainage is of the first necessity, and which is always productive of amelioration of climate. The influence of plantations is, therefore, upon the whole, beneficial, although vast masses of forests are injurious to climate:

and it must be admitted that in some localities the planting of trees has been carried to excess, so that fields often suffer, particularly in autumn, from want of free circulation of air, and the landscape is often restricted to very narrow limits. The remedy in such cases is obvious; and it not unfrequently happens that within a short distance new plantations might be formed with every prospect of benefit.

Much has been written about the pruning of forest trees, with a view especially to the production of taller and straighter stems; and considerable difference of opinion exists as to the extent to which pruning should be practiced. It is, however, very generally delayed till the branches to be removed have attained too great a size, and is then very rudely performed, to the spoiling of the timber rather than to the improvement of it. The practice of leaving *snags*, instead of cutting branches clean off, has particularly bad effects. Pines and firs, from their manner of growth, need pruning less than trees of other kinds. When trees have been planted, not merely for profit but for ornament, this ought to be remembered in pruning, which, however, is too often intrusted to persons utterly devoid of taste; and trees which, as they naturally grew, were very beautiful, are so treated with axe and saw that they become deformities instead of adorning the scene.

In forming plantations, different kinds of trees are very generally mixed, although masses of one particular kind are also frequently planted. It is usual, however, to plant along with those which are destined most permanently to occupy the ground, trees of other kinds as *nurses*, to be gradually removed as the plantation advances in growth. For this purpose, spruce and larch are more generally employed than any other tree; although Scotch fir and birch are also deemed suitable for certain situations. The removal of some of these nurses affords the first returns of profit from the plantation, which is afterwards thinned from time to time. Plantations far more frequently suffer from being thinned too little, than from being thinned too much. To the want of proper thinning is to be in part ascribed the failure of many of those narrow belts of *planting* which are too common in Scotland, and which, having been intended for shelter, very imperfectly serve their purpose, and seem to have suffered from the hardest usage themselves. The thinning of a plantation which has been allowed to grow too thick, must, however, be very gradually performed, that it may be beneficial, and not injurious. After a sudden thinning, a plantation sometimes ceases to thrive, and many trees are often laid prostrate by the next storm; for trees accommodate themselves both in their roots and branches to the situations in which they grow.

A considerable number of years must elapse before any pecuniary return is derived from a plantation, yet this mode of employing soils is often found to be the most remunerative of which they are capable, even without reference to the improvement of adjacent lands to which shelter is afforded; and the increased demand for timber in Britain, for *sleepers* of railways and other purposes, tends to the still further encouragement of A.

The resinous products of pine-woods are not considered as a source of profit in Britain; but the tar, turpentine, and resin obtained from them in some parts of Europe, form articles of commerce. The great pinaster plantations already mentioned, on the sands between the Adour and Gironde, now yield products of this kind in large quantity. The employment of trees for ornamental purposes belongs not so much to A. as to landscape gardening (q. v.). The transplanting (q. v.) of large trees is only practiced for ornamental purposes. Hedgerow trees are planted chiefly for ornament, although sometimes they may afford useful shelter; but where this is not the case, they can seldom be reckoned profitable, as they are injurious to crops. Copse or coppice-wood differs so much, both in its uses and in the mode of its management, from other plantations, that it must be briefly noticed in a separate article.

The wholesale and thoughtless destruction of forests by lumbermen in the United States long ago attracted attention in the older states, and measures have been taken to remedy and counteract the evil. The most efficient of these is A., which is now well developed in the eastern, middle, northern, and western states. It is estimated that, even in New York, timber has been destroyed at the rate of 150,000 acres per year, most of the wood going for railroad fuel and building. Landowners, however, are growing more careful, and the young trees, once grubbed out as worthless brush, are now very generally not only spared but nursed. The ordinary process with natural growth is to exclude browsing cattle, and then thin out, taking the crooked and damaged first, and next such as will make hoop poles, hay stakes, etc. The timber left will grow more rapidly and will be more handsome and valuable than a full natural growth. With care, the growing trees may be grouped in lines, and ample wagon roads be left for ease of communication with highways or other fields. Raising trees from seed takes more time and care, but will furnish better timber and larger profit. In this practice the ground is prepared as if for corn, and the seed sown by hand or drill in hills or rows. For a year or two, corn and trees may grow in alternate rows, if desirable to get immediate profit from the land. Large seeds, like chestnuts and walnuts, are planted about three or four times their own diameter below the surface. Evergreen seedlings must be shaded through the first summer, removing the shade occasionally that the plants may be hardened. Not much is done in the way of transplanting in the older states, except for parks and orna-

mental purposes. In Minnesota and other western states, the successful culture of trees is accepted in lieu of certain taxes, and millions of trees are transplanted annually. It is important to preserve old or raise new trees in thick belts or ranks for the protection of houses, crops, and cattle, against heavy winds and storms. Such protection often saves the half or nearly the whole of winter grain. Where such belts should be planted depends upon the situation of the farm with reference to the prevailing direction of the winds. Simply for ornamentation, A. is largely practiced, and is growing in importance, and men of knowledge and experience are employed for the purpose in public and private parks and cemeteries.

ARBOR VITÆ, *Thuja*, a genus of plants of the natural order *coniferae*, allied to the cypress, and consisting of evergreen trees and shrubs with compressed or flattened branchlets—small, scale-like, imbricated leaves—and monœcious flowers, which have 4-celled anthers, and the scales of the strobiles (or cones) with two upright ovules.—The common A. V. (*T. occidentalis*) is a native of North America, especially between lat. 45° and lat. 49°, but has long been well known in Europe. It is a tree of 40 to 50 ft. high; its branches are horizontally expanded, and the strobiles (cones) small and obovate. The young leafy twigs have a balsamic smell, and both they and the wood were formerly in great repute as a medicine; the oil obtained by distillation from the twigs, which has a pungent and camphor-like taste, has been recently recommended as a vermifuge. The wood of the stem is reddish, soft, and very light, but compact, tough, and durable, bearing exposure to the weather remarkably well. The tree is very common in Britain, but planted chiefly as an ornamental tree, and seldom attaining so great a size as in its native country. It delights in cool, moist situations.—The CHINESE A. V. (*T. orientalis*), a native of China and Japan, which is immediately distinguishable from the former species by its upright branches and larger, almost globose and rough strobiles, is also in Britain, and upon the continent of Europe, a common ornament of pleasure-grounds; but it does not attain so great a size as the preceding, and is more sensible of the cold of severe winters. The balsamic smell is very agreeable. The tree yields a resin, having a pleasant odor, to which high medicinal virtues were formerly ascribed; hence the remarkable name *arbor vitæ* (Latin, signifying tree of life), given to this species, and extended to the genus. Other species are known, but they are less important than these. In its native country, this species also attains the size of a considerable tree.—There are several other species of *Thuja*, some of which seem well suited to the open air in the climate of Britain, and others require the protection of green-houses. Amongst the former are *T. plicata*, from Nootka sound; and *T. dolabrata*, a native of Japan, a tree of great height and thickness, and which will not improbably prove the most important of the whole genus.—A tree, common in North America, and there known by the name of WHITE CEDAR, is sometimes included in the genus *Thuja*, under the name of *T. sphaeroides*, but is more generally ranked in the genus *cupressus* as *C. thyoides*. See CYPRESS. The timber is highly esteemed, and an infusion of the scrapings is sometimes used as a stomachic.—Closely allied to the genus *Thuja* is *callitris*. See SANDARACH.

ARBROATH, ABERBROTHWICK, or ABERBROTHOCK, a seaport t. in the e. of Forfarshire, situated at the mouth of a stream called the Brothock. Here king William the lion founded a Tyronensian abbey in honor of Thomas à Becket in 1178. The king was interred in it in 1214. In the abbey, Bruce and the Scottish nobles met in 1320, to resist the claims of Edward II. to Scotland. Cardinal Beaton was the last of its abbots. Next to Holyrood, the abbey was the most richly endowed monastery in Scotland. It was destroyed by the reformers in 1560. Its ruins—which are cruciform, 270 by 160 ft.—are very picturesque, presenting lofty towers, columns, gothic windows, and a fine circular east window, “the Round O of A.” The chief industries of A. are flax-spinning, jute-spinning, and the manufacture of sail-cloth. The new harbor, begun in 1841, admits vessels of 400 tons; it is protected by a breakwater. The chief exports are grain, potatoes, fish, pork, and pavement, chiefly from Lower Devonian quarries 8 or 10 m. inland. A. is a royal burgh, and in conjunction with Montrose, Brechin, Forfar, and Bervie burghs, returns one member to parliament. Pop. in 1891 of parliamentary burgh, 22,960. A. is supposed to be the Fairport of *The Antiquary*, and the Redhead crags and caves form some of the scenes in that novel. The famous Bell-rock light-house stands in the sea, 12 m. s. e. of Arbroath.

ARBUTHNOT, JOHN, 1667–1735, a noted writer and physician, the contemporary and friend of Pope and Swift, was the son of a Scottish Episcopal clergyman; and b. at Arbuthnot, in Kincardineshire, shortly after the restoration. He studied medicine at Aberdeen, where he took his degree. A.’s father was obliged to resign his charge at the revolution. His sons’ prospects being thus blighted in their own country, they were under the necessity of going abroad to seek their fortune. John removed soon after to London, and there supported himself by teaching mathematics. In 1697, he published an examination of Dr. Woodward’s account of the deluge, which brought him into notice as a person of no common ability. Accident called him into attendance on prince George of Denmark, who thenceforth patronized him. In 1709, he was appointed physician to the queen, and in 1710 was elected a member of the Royal college of

physicians. On the death of Queen Anne, in 1714, he lost his situation, and his circumstances were never so prosperous afterwards. In 1717, A., along with Pope, gave assistance to Gay in a farce, entitled *Three Hours after Marriage*, which, however, in spite of having the aid of a trio of wits, proved a complete failure. In 1723, he was chosen second censor of the Royal college of physicians: in 1727, he was made an elect, and had the honor to pronounce the Harveian oration for the year. He died at Hempstead, in 1735. A. was one of the leaders in that circle of wits which adorned the reign of Queen Anne, and was still more nobly distinguished by the rectitude of his morals and the goodness of his heart. He assisted Swift and Pope in the composition of that brilliant satire, the *Memoirs of Martinus Scriblerus*, contributing those portions of it which refer to science and philosophy; and he was undoubtedly the author of the celebrated political *jeu d'esprit*, the *History of John Bull*, which has so often been imitated. Besides several medical essays, he published *Tables of Greek, Roman, and Jewish Measures, Weights, and Coins* (London, 1705-8), a work which was long the best authority on the subject. There is also a philosophical poem of his composition in *Dodsley's Miscellanies*, entitled "Know Thyself."

ARBUTUS, a genus of plants of the natural order *Ericææ*, containing a number of species, small trees and shrubs, the greater part of which are American. The fruit is fleshy, 5-celled, many-seeded, usually dotted with little projections, whence that of some species has a sort of resemblance to strawberries; the corolla is urn-shaped.—*A. U'nedo*, the STRAWBERRY TREE, is a native of the south of Europe, found also in Asia and America, and in one locality in the British isles, the lakes of Killarney, where its fine foliage adds much to the charm of the scenery. It requires protection in winter in the climate of Paris. In Britain, it is often planted as an ornamental evergreen. It grows to the height of 20 to 30 feet but is rather a great bush than a tree. The bark is rugged; the leaves oblongo-lanceolate, smooth and shining, bluntly serrated; the flowers nodding, large, greenish white; the fruit globose, of a scarlet color, with a vapid sweetish taste. It is, however, sometimes eaten. Of late, excellent alcohol has been made from it in Italy. A wine is made from it in Corsica, which, however, is narcotic, if taken in considerable quantity, as the fruit itself is, if eaten too freely. The bark and leaves are astringent.—*A. andrachne* is also sometimes cultivated as an ornamental plant in Britain, but is impatient of severe frosts. Its fruit, and that of *A. integrifolia*, are eaten in Greece and the east. But all the species seem to possess narcotic qualities in greater or less degree; the fruit of *A. furens*, a small shrub, a native of Chili, so much as to cause delirium.—*A. aculeata*, which abounds at Cape Horn and on Staten Island, is an elegant and most pleasing evergreen, very much resembling the myrtle. It grows to the height of 3 or 4 feet, and produces small white flowers, followed by a profusion of red shining berries, which ornament the bush during winter. Their flavor is insipid, but somewhat astringent. Mixed with a few raisins, they have been made by voyagers into tolerable tarts. *A. uva ursi*, now generally called *arctostaphylos uva ursi*, the RED BEARBERRY, is a small trailing evergreen shrub, common in the Highlands of Scotland and in the Hebrides, and indeed in the northern parts of Europe, Siberia, and North America. It grows in dry, heathy, and rocky places.

ARBUTUS, TRAILING (*epigæa repens*), called mayflower in New England and ground-laurel in the southern states. A prostrate or trailing plant, with evergreen leaves and clusters of fragrant rose-colored or white flowers, opening in early spring; found in sandy or rocky soil, especially in the shade of pines. It grows from Canada to Texas, but is particularly abundant in New England, the Middle and South Atlantic States, as well as in Michigan, Wisconsin, and Minnesota.

ARC (Lat. *arcus*, a bow) is any part of a curved line. The straight line joining the ends of an A. is its *chord*, which is always less than the A. itself. Arcs of circles are *similar* when they subtend equal angles at the centers of their respective circles; and if similar arcs belong to equal circles, the arcs themselves are *equal*. The length of an A. is readily found if the angle which it subtends at the center of the circle is known, and also the length of the whole circumference. Let the whole circumference be 100, and the angle of an A. 50°, the length of the A. is

$$360^\circ : 50^\circ :: 100 : \frac{100 \times 50}{360} = 14 \text{ nearly.}$$

ARCC. See JOAN OF ARC.

ARCA, or ARK-SHELL, a genus of bivalve shells, and lamello-branchiate mollusca, the type of a family called *arcadæ* or *arcacææ*. In the true ark-shells, the hinge is straight, and occupies what at first seems the whole length of the shell, but is in reality its whole breadth, the breadth being greater than the length. One species is found on the British shores; the species are larger and more numerous in the seas of warmer climates, and some of them are frequently to be seen among the shells employed for the ornament of drawing-rooms, etc. Fossil *arcadæ* are, however, more numerous than recent species.

ARCADE (Fr.), a row of arches, supported by columns, either having an open space of greater or less width behind them, or in contact with masonry. The A. in Gothic corresponds to the colonnade in classical architecture, the difference between them being that, whereas the pillars in the colonnade support straight architraves, those in the A. support arches. The term A. is sometimes applied to the row of piers, or columns and arches, by which the aisles are divided from the nave of a church, or by which

cloisters, or what are erroneously called piazzas in Britain, are inclosed; but it is more generally confined to those series of smaller arches which are employed simply for purposes of ornamentation. Arcades of the latter kind are often found surrounding the square towers of English churches. Of this we have early examples in the church of Middleton Stoney, Oxfordshire, and in the still older ones of Tewkesbury, and Christ church in Oxford. The term is also applied, improperly, to a glass-covered street or lane, with a row of shops or stalls on each side.

ARCADIA, the middle and highest part of Peloponnesus, was bounded on the n. by Achaia, on the e. by Argolis, on the s. by Messenia and Laconia, and on the w. by Elis. According to Pausanias, it derived its name from Arcas, the son of Callisto. Next to Laconia, A. was the largest country in the Peloponnesus. It had an area of 1700 sq.m., and was girt round by a circle of mountains, which cut off to a large extent its communication with the rest of the peninsula. Mountains also intersected it in different directions. The western part of what was anciently A., is wild, bleak, and rugged, and was at one time covered with huge forests; the eastern is more fertile, the mountains not so high, and the vales more luxuriant. In these eastern valleys lay all the principal cities of A. The loftiest peak in A.—the loftiest also in the Peloponnesus—is Mt. Cyllene, in the n.e., 778 ft. The chief river was anciently the Alpheius, (q.v.). Originally A. was named Pelasgia, after its first inhabitants, the Pelasgi. Subsequently, it was divided into several small states, which formed a confederation. Of these united states, the chief were Mantinea, Tegea, Orchomenos, Pheneus, Psophis, and Megalopolis. The inhabitants, engaged chiefly in tending cattle and in hunting among the wild highlands, remained long in a state of barbarism. After civilization had advanced, and the Arcadians had become known by their love of music and dancing, they still retained some military spirit, and were sometimes engaged as mercenary soldiers. But generally their character accorded with their simple, rural mode of life; though it seems certain that human sacrifices were offered as late as the period of the Macedonian sway. The Arcadians were not remarkable for their intelligence. In fact, an "Arcadian youth" was a synonym for a blockhead. Pan and Diana were their favorite deities. Ancient and modern poets (the latter especially in the time when "pastorals" were popular) have described A. as the land of peace, innocence, and patriarchal manners.

ARCADIUS, first emperor of the east (395–408 A.D.), was b. in Spain, 383 A.D., and was the son of the emperor Theodosius, after whose death the Roman empire was divided into east and west. A. lived in oriental state and splendor, and his dominion extended from the Adriatic sea to the river Tigris, and from Scythia to Ethiopia; but the real rulers over this vast empire were, first, the Gaul Rufinus, and afterwards the eunuch Eutropius, who openly assumed the reins of government and the command of the army, while A. reposed in luxurious indifference. In 399, the eunuch Eutropius was deposed by another usurper, Gainas, who, in his turn, soon fell a victim to his own ambition. Afterwards, Eudoxia, the wife of the emperor, assumed the supremacy. One really great man adorned this period, the virtuous and eloquent Chrysostom, who was persecuted by Eudoxia, and through her influence exiled in 404, on account of his firm opposition to Arianism, which the empress herself favored. During the reign of A., his territories suffered by barbarian incursions, earthquakes, and famine, but nothing could disturb the indifference of the monarch. He d., unlamented, 408 A.D.

ARCACHON, a bathing-place which has grown up since 1854, on the south side of the Bassin d'Arcachon, 34 miles southwest of Bordeaux by rail. The fine broad sands are admirably adapted for bathing, and the place is sheltered by sand-hills covered with extensive pine-woods. Its main street stretches $2\frac{1}{2}$ miles along the shore, with the pine-forests immediately behind. The climate is always temperate. Its numerous villas among the firs are much frequented in the winter by invalids afflicted with lung disease. Scientific oyster-culture is practised here on a large scale. Pop. 8000.

ARCA'NI DISCIPLINA (system of secret instruction). See MYSTAGOGUE.

ARCANUM, THE GREAT. In the middle ages the Latin word *arcanum*, literally meaning *secret*, was used of any of the most valued preparations of alchemy (q.v.), but the name *great arcanum* was especially applied to the highest problems of the science, the discovery of such supposed great secrets of nature as the elixir of life or the philosopher's stone.

ARCE' (anc. *Arx*), a t. of south Italy, in the province of Caserta, 60 m. e.s.e. from Rome. It is situated on a hill near the Liris; and the summit of the hill, which is lofty and precipitous, is crowned by an interesting mediæval fortress called *Rocca d'Arce*. This fortress was considered impregnable till it was scaled and taken by the invading army of Charles of Anjou in 1266. Numerous inscriptions in which the name of Cicero occurs have been discovered near A.; and some ruins near the town are known as *L'aja di Cicerone*, or Cicero's barn. Pop. of commune, 5467.

ARCESILA'US, a Greek philosopher, founder of the New Academy, was b. at Pitane in Æolia, Asia Minor, 316 B.C. He studied philosophy, first under Theophrastus the peripatetic, and afterwards under Crantor. After the death of Crantor, A. became the chief master of the academic party, or those who held to the doctrines of Plato; but he introduced so many changes that its philosophic character was completely changed. His great rivals were the Stoics, whose opinions he attacked, but he does not appear to have attained any certainty in his own convictions. He had studied under too many

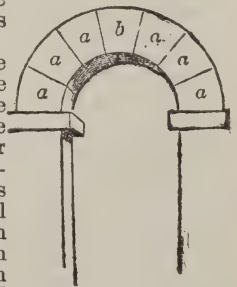
masters, and discussed too many different systems, to be sure of the truth of any. He denied the Stoical doctrine of a "convincing conception," which he affirmed to be, from its very nature, unintelligible and contradictory. He also denied the existence of any sufficient criterion of truth, and recommended abstinence from all dogmatic judgments. In practice he maintained that we must act on grounds of probability. It is not easy to determine satisfactorily what his moral character was. A wit, a poet, and a man of frank and generous disposition, which seems to have captivated his disciples even more than his philosophy, he has yet been accused by his enemies of the grossest profligacy; and whatever extravagance there may be in such an extreme charge, it is tolerably certain that he died of a debauch in his 76th year (241 B.C.). Nevertheless, his adversary Cleanthes, the Stoic, passed this high eulogium on him: "The morality which A. abolishes in his words, he re-establishes in his actions."

ARCH, an arrangement of bricks, stones, or other materials over an open space, by which they are made not only to support each other by mutual pressure, but to sustain a superincumbent weight. We have the excellent authority of sir G. Wilkinson for stating that the A. was known to, and used by, the ancient Egyptians; and that the Assyrians were acquainted with its principles is placed beyond doubt by the arched gateways so frequently represented in their bas-reliefs. The A. is generally supposed to have been unknown to the Greeks—a supposition which becomes very improbable if we hold it to be proved that it was used by nations with whose works they must have been familiar. But that the Greeks did not employ it generally in their architectural structures is certain; and as it is not less certain that the Romans did, it is to the latter people that the nations of modern Europe are indebted for their acquaintance with its great utility. The introduction of the A. by the Romans gradually effected a complete revolution in the architectural forms which they borrowed from the Greeks. The predominance of horizontal lines gave way by degrees, till, as the Romanesque passed into the Gothic style, it was superseded by the segments of a circle, placed generally more or less in a perpendicular direction. In its earliest application by the Romans, the A. did not spring from the entablature of the columns, but was generally placed behind them, and rested upon separate imposts. Subsequently, this arrangement was departed from, and the A. assumed the position which it has since retained above the columns; sometimes having an entablature interposed, and sometimes rising directly from the capital of the column or pier, as in the Romanesque. Before mentioning very briefly the different forms of the A., it seems natural to refer to a very simple structure, frequently met with in those early edifices in our own country which we are in the habit of designating as Saxon. It consists of two stones, their lower ends resting on rude piers, their tops leaning against each other, and thus forming two sides of a triangle, which is capable of supporting a moderate superincumbent weight. The mechanical principles on which the A. depends, though here very imperfectly employed, seem sufficiently called into play to suggest their more extensive application; and it is not impossible that out of this rude construction the A., in its later and more elaborate forms, might have developed itself amongst ourselves without hints from foreign sources.

Of the A. itself, the following variations of form may be enumerated: The semi-circle, the segment, the ellipse, which were the only forms employed by the ancients, and which alone were known in mediæval architecture up to the time at which the pointed A. was introduced. Of these, the stilted A. and the horseshoe A. are modifications, in both of which the center or point from which the A. is described is above the line of the impost, but in the former of which the moldings are continued downwards vertically; whilst in the latter they are slightly inclined inwards, or the curve is prolonged till it meets the impost. The horseshoe A. belongs peculiarly to Arabian architecture (q.v.), not only from its having originated simultaneously with the faith of the prophet, but from its continuing to be used exclusively by his followers. Next, in point of time, though far surpassing all the others in beauty and variety, is the pointed A., the origin of which is still a subject of antiquarian controversy. The greater or less acuteness of the pointed A. depends on the position of the two center points from which its curved sides are described.

Of the foil arches or arches in which the forms of a leaf are imitated may be mentioned the trefoil, the cinquefoil, and the polyfoil, the latter being met with in Arabian and Romanesque buildings. At a later period of Gothic architecture, with the decorated style, the ogee A. was introduced, and the Tudor or four-cornered A. appeared about the commencement of the perpendicular style. When first introduced, the proportions of this A. were bold and effective; but it was gradually depressed till the principle of the A. was lost, and its very form was again merged first in two and then in one flat stone or lintel over an opening. With the last form of the Tudor A. we thus reach almost the point of departure in the construction of the A., and complete our enumeration of its forms.

The sides of an A. are termed *haunches* or *flanks*, and its highest part is called the *crown*. The wedge-shaped stones, bricks, or other materials of which an A. is con-



structed are called *voussoirs* (*a, a, a*); the uppermost one of all (*b*) is called the *keystone*; the lowest, which is placed immediately over the impost, the *springer*, or springing-stone; the under or lower side of the *voussoirs*, the *intrados*; the upper side, the *extrados* or *back*. For the investigation of the mechanical principle of the *A.*, and of the conditions of stability, see Moseley's *Mechanical Principles of Engineering and Architecture*. See also BRIDGE, IMPOST, PIER, BUTTRESS.

ARCH, TRIUMPHAL, was a structure erected by the Romans across roads, or at the entrance of cities, in honor of victorious generals. The original triumphal arch was the *Porta Triumphalis*, one of the gates of Rome through which the triumphal procession entered the city. Among the earliest detached arches built at Rome was that built by Scipio Africanus (190 B.C.) on the Capitoline hill. Under the emperors, these structures became numerous and magnificent, and were decorated with bas-reliefs and inscriptions. Three of what were properly triumphal arches still remain in Rome, those, namely, of Titus, Septimius Severus, and Constantine. Numerous similar monuments exist also in other parts of the old Roman empire, as at Rimini, Susa, Verona, Ancona, Orange (in France), Capura (in Spain).

ARCH, JOSEPH, an English agriculturist, b. 1828. His parents were in humble circumstances, and he educated himself; at an early age he became an advocate of temperance and a Methodist local preacher. He rebelled against the low price paid for farm-labor, and after much struggle and suffering became a leader in efforts to better the condition of laboring men. In 1872, the national agricultural laborers' union was formed, and A. became its president. In 1873, he visited Canada and the United States to study the condition and prospects of labor, and the question of emigration. In 1885 he was elected to parliament as a liberal, was defeated in 1886, and re-elected in 1892 and in 1895.

ARCHÆAN, or AZOIC, PERIOD—from the Greek for ancient—commencing with the earliest formation of the earth's crust, is the period to which are assigned the oldest rocks on which those of late ages have been spread, and from which most of them have been made. The archæan rocks, extending round the globe, are in most places shut out from sight by the later formations, yet in various parts of both hemispheres, rising above the rest, they are exposed to view as surface rocks. In Europe they are visible in the n.w. of Scotland, in the iron regions of Norway and Sweden, in the n.w. and n.e. of Russia, down to the White sea, in the Ural mountains, and further s. in Podolia. In central Europe they appear in the midst of the more recent formations, protrude frequently in the Carpathian mountains and central crests of the Alps, and in Bavaria and Bohemia between the Danube and the Elbe. In North America they rise to the surface in a large district between the Arctic circle and the great lakes, in a tract s. of lake Superior and another in southern New York, in the Highlands, and in the central part of the Appalachian chain and Rocky mountains. In Canada, where they have been carefully studied, they are believed to be more than 30,000 ft. thick; in Europe their exact thickness can scarcely be conjectured, yet it must be many thousand feet. These rocks are chiefly crystalline, such as granite, syenite, gneiss, syenitic gneiss, mica-schist, hornblende schist, chlorite slate, and granular limestone. There are also some hard conglomerates, quartz rocks, and slates. They very often contain iron-bearing minerals, and immense beds of iron ore are found with them in northern New York—where they are from 100 to 200 ft. thick—New Jersey, Michigan, and south of lake Superior. Graphite also is found abundantly throughout the archæan rocks of Canada and the adjacent parts of the United States. In the archæan rocks indications of life are almost if not entirely wanting. For this reason the period is named also the *azoic*, lifeless. But in the limestones of Canada a form has been discovered which is thought by eminent geologists to be a coral-like fossil made by protozoans of the class of rhizopods, the simplest kind of animal life. Its organic nature has not indeed been placed beyond doubt; still geologists think it probable that rhizopods existed in the waters before the close of the archæan period, and that the beds of limestone have been made up of their minute shells. The abundance of graphite found throughout the archæan rocks of Canada and the United States is also regarded as an indication that organic plants then existed, as it is known that in late times graphite has been formed out of such remains. For these reasons the name *ozoic*—the dawn of life—has been applied by some geologists to the archæan period. Others class all rocks preceding the Paleozoic period under the term *A. Group*.

ARCHÆOLOGY. "*Monumentorum artis qui unum vidit nullum vidit, qui milia vidit unum vidit.*" (Gerhard.)

Definition.—Archæology is, as its name implies, the science (*λόγος*) of antiquities (*ἀρχαία*)—that is, of the material remains of ancient peoples. But from the fact that in its origin and development it has been primarily and chiefly concerned with the artistic and architectural remnants of the Græco-Roman world, it is generally taken to mean the science of Greek and Roman antiquities, in which sense the term will be used in this article, without losing sight of the connection subsisting between these monuments and those of the more ancient peoples to whom they owe in great measure their inception.

History of the Science.—As a science archæology cannot justly be said to have existed before the present century, although the way had been gradually paved for it from the time of the Italian Renaissance. The passion for the artistic relics of Græco-Roman civilization, which then took such surprising hold upon the cultured classes of Italy under the

papal sway, led to the foundation of museums, in which were gathered together, often at vast expense, statues of bronze and marble, vases, inscriptions, gems, jewelry, and coins, affording material for study and comparison, under the guidance of the various statements and criticisms preserved in the works of the ancient writers. The spoils brought over from Greece by her Roman conquerors, and the mania for collecting treasures from the same source, which had been displayed by many Roman amateurs, chief among whom may be mentioned the emperors Augustus, Caligula, and Nero, as well as the great artistic and architectural activity in imperial Rome under the guidance of Greek masters, had rendered that city a mine for the early archæologists; and furthermore about the time of the Renaissance much filtered in from Greece itself. (Cf. Lanciani, *Ancient Rome in the Light of Recent Discoveries*, Boston and New York, 1889.)

The father of modern archæology is Johann Joachim Winckelmann (1717-1768), whose writings, although superseded in many points, are still of value, and who by his genius marked out the field since so successfully cultivated. He first presented to European scholars an authentic account of the discoveries made in the Campanian city of Herculaneum (buried by an eruption of Vesuvius in 79 A.D., excavated in 1738-80, and again, for short periods, in 1827 and 1866), and, more than all, first wrote a systematic history of ancient art (*Geschichte der Kunst des Alterthums*, 1764, vid. Winckelmann's complete works, ed. Meyer and Schultze, Dresden, 1809). By a passage in Winckelmann's writings, Lessing was stimulated to the composition of his great æsthetic essay "Laocoon," and Goethe also was powerfully influenced by him. Thus the seed of the new science was planted, to develop after the æra of the wars of the French Revolution. The excavation of Herculaneum, suspended largely on account of the depth of the volcanic deposit and the increasing danger and difficulty of the work, has been already mentioned. It is impossible to dwell here at length upon the artistic treasures thereby brought to light. A site in many ways more promising and accessible, of which the unearthing has given us a remarkably perfect view of an ancient city, was offered by Pompeii, where excavations were begun in 1755 (seven years after the accidental discovery of the buried town) and have been carried on more or less continuously ever since. Here, too, many priceless monuments of ancient art were found. In Greece itself English scholars were at this time doing what could be done under the Turkish régime. The chief result was the splendid work of Stuart and Revett, *The Antiquities of Athens* (4 vols., 1762-1816). The expedition sent out by the Society of Dilettanti to continue their work accomplished but little. The Napoleonic occupation of Egypt led to the recovery of the key to the hieroglyphs, and opened to savants that seat of incalculably ancient civilization, to which the debt of the Greeks cannot even yet be accurately estimated. The sculptures of the Parthenon removed to London by Lord Elgin (1801-3) were a revelation to European scholars. These, together with the reliefs from the temple of Apollo Epicurius at Bassæ, near Phigalia, in Arcadia, discovered in 1812, were subsequently acquired by the British Government, and form a most important part of the archæological treasures of the British Museum. In 1811 the same English and German explorers who had brought to light the Phigalian marbles, discovered the remains of the remarkable pedimental groups of the temple of Athena, on the island of Ægina, which were purchased by Prince Ludwig of Bavaria, and placed in the Glyptothek at Munich, where they have afforded German scholars fruitful material for study. The Aphrodite of Melos, discovered in 1820, and presented to Louis XVIII. of France, forms the great glory of the Louvre collections, and is still the subject for discussion apparently as endless as profitable. The successful termination of the Greek War of Independence (1821-29) opened a new mine from which somewhat was immediately realized by the French exploration of the Morea (Peloponnesus) in 1829. But the sculptures then brought from Olympia and deposited in the Louvre were but a foretaste of what was to come. The foundation of the "Istituto di Corrispondenza Archæologica," by Gerhard, in 1829, was one of the most important steps in the history of archæological progress. This institution, now the Imperial German Archæological Institute (Kaiserliches Deutsches Archæologisches Institut) has, by its publications and by the training of young scholars, been of inestimable value.* The French School of Archæology established at Athens in 1846, as well as the activity which began to be displayed by certain Greek savants under the Bavarian régime, had also an important influence on the development of our science. The important finds made in Etruscan tombs at Vulci, in 1828, added vastly to the stock of ancient Greek vases previously known to scholars, and have been followed by a long series of successful riflings of other necropolises. The discoveries of Layard at Nineveh (1845-6), and the subsequent decipherment of the cuneiform inscriptions, revealed the ancient civilization of the Euphrates valley, and gave new material for a more accurate estimate of the relative position of Greek culture and art. We must not omit to mention here the important addition made to the British Museum by the discoveries of Sir Charles Fellows in Lycia (1840), of Wood at Ephesus (1867-74), and of Newton at Branchidæ, Halicarnassus, and Cnidos.

The study of Greek inscriptions under Boeckh and Franz, and of comparative lin-

* For a fuller account of this institution, cf. an article by Michaelis, "The Imperial German Archæological Institute," translated in the *Jour. Hellen. Stud.*, 1889, pp. 190 sqq.

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ARCHÆOLOGY.—I. Ideal view of an ancient lake-village. 2. Roman marble table with glass vessels. 3. Pincers of bronze-age. 4, 5. Implements from Swiss lake-dwelling of bronze-age. 6. Roman candelabrum. 7. Roman vessel. 8. Egyptian axe. 9, 10. Implements from Swiss lake-dwelling of bronze-age. 11. Roman candelabrum. 12. Roman vessel. 13. Egyptian axe. 14, 15. Heads from Etruscan tombs. 16. Egyptian Peruvian grave. 17. Hammer-head of stone-age. 18. Roman chafing-dish. 19. Roman



re. 3. Etruscan chariot. 4, 6. Pre-historic jars. 5. Etruscan chair. 7. Battle-axe of
 II, 12, 15, 17. Greek ornaments. 18. Horn of the bronze-age. 13, 19. Ornaments,
 ancient Peruvian vessels. 24. Egyptian harp. 25. Bronze throne of King Dagobert.
 r., 31. Ancient Italian Urn. 32. Amber ornament of stone-age. 33. Copper star from
 key. 37. Utensil of bronze-age.

guistics under Bopp and his successors, contributed their share to the modern archæologist's equipment. We have now brought the account down to the last and most important period. The greatest widening of our knowledge of prehistoric civilization on Greek soil is due to the unrivaled enthusiasm, diligence, and devotion of Henry Schliemann, who unearthed Troy, laid open the treasures of Mycenæ, and investigated Tiryns and Orchomenus—to mention merely his most important achievements. His work has put the Homeric age in a new light. The founding of the Athenian branch of the German Institute (1874), and subsequently of the American and British schools at Athens, has, under the favoring auspices of the Greek Government, and in conjunction with the labors of Greek investigators, been fruitful of excellent results, while important work has been constantly carried on by the French School. The details of the results achieved in various parts of the Greek world, as well as in Italy, by the several governments and societies engaged during the last two decades, exhibit a truly astonishing activity; and the publications of all kinds on classical archæology have already reached an unwieldy bulk. The excavations at Olympia, carried on by the German Government under the special treaty of 1874, were well rewarded (witness the Hermes of Praxiteles, the Victory of Pæonius, and the Pediments of the Temple of Zeus); and those at Pergamon, on the Acropolis of Athens, in Delos, and at Icaria, may also be mentioned among many others. Important side-lights have been thrown upon Greek history by the excavations of the Egypt Exploration Fund, notably by those at Naucratis, the ancient Greek commercial town founded some six centuries before our æra near the western arm of the Nile, s.e. of the later Alexandria. Cyprus, from which much in statuary and other works of art had been brought by Cesnola (now chiefly in the Metropolitan Museum, New York), is undergoing more scientific investigation by English scholars. The excavations at Rome have been under the care of an Italian archæological commission, by which many questions of topography have been settled, and many objects of art, together with a host of inscriptions, brought to light. The work of active research is going on at a score of points with unabated vigor, and many ancient sites still await the spade.

As may be inferred from this sketch, archæology is an eminently progressive science, and in all its departments subject to constant revision. The steady increase of material, and the filling of gaps in the general structure, as well as continual correction or rejection of hastily formed theories and insufficiently supported conclusions, will occupy savants for generations to come. We can only deal provisionally with the most certain and generally accepted data, supplementing the statements of ancient writers by the monuments, and interpreting the monuments in turn by our literary sources.

Literature.—Collignon, *Manual of Greek Archæology*, translated by J. H. Wright, Cassell & Co. (1886); Brunn, *Geschichte der Griechischen Künstler* (2d ed., Stuttgart, 1889); Overbeck, *Geschichte der Griechischen Plastik*. (3d ed., Leipzig, 1881–2), and *Die Antiken Schriftquellen zur Geschichte der bildenden Künste bei den Griechen* (Leipzig, 1868); Murray, *History of Greek Sculpture* (2d ed., London, 1890); Mitchell, *History of Ancient Art* (New York, 1883); Baumeister, *Denkmäler des classischen Alterthums* (Munich and Leipzig, 1885–8); *Archæologische Zeitung*; *Jahrbuch des Deutschen Archæologischen Instituts*; *Bulletin de Correspondance hellénique*; *Ἑφημερίς Ἀρχαιολογική*; *American Journal of Archæology*. (Cf. also an admirable sketch of Greek art by Kékulé in Baedeker's *Griechenland*.)

For our purpose we may divide the general subject of classical archæology, from an historical point of view, into the following periods:

I. Pelasgo-Achæan Period, from circa 1500 B.C. or earlier, to the Dorian conquest, circa 1000 B.C.

II. Earlier Hellenic Period, from circa 1000 B.C. to the æra of the Persian Wars, circa 500 B.C.

III. Period of Hellenic Prime, from circa 500 B.C. to the Macedonian supremacy, circa 350 B.C.—the period of Phidias and Praxiteles.

IV. Period of Hellenic Dissemination and Decline, from circa 350 B.C. to the Roman conquest, circa 150 B.C.—the period of Lysippus and of the Rhodian and Pergamene schools, so called.

V. Roman Period, from circa 150 B.C. to circa 150 A.D. or later—the period of the union and united achievement of Greek and Roman civilization.

For convenience, the consideration of Roman art, properly so called, will be reserved to the last period.

I. PELASGO-ACHÆAN PERIOD.—The excavations carried on by Schliemann at Troy (Hissarlik), Mycenæ, Tiryns, and Orchomenus, and by other investigators at Mycenæ, as well as at Spata and Menidi in Attica, near Bolos (Volo) in Thessaly, under the citadel of Palamidi at Nauplia, and lastly at Bapheion, near Sparta, have revealed or brought more clearly into view (for the walls of Tiryns and Mycenæ had never been buried) a most important class of monuments, which seem justly to be referred to a period antedating the Dorian conquest, i.e., about 1500–1000 B.C. A much older dating for this civilization is claimed. (See note on Flinders-Petrie's paper, under the literature at the end of this period.)

Most noteworthy among the objects found in these excavations are the treasures of Mycenæ. Here were unearthed, partly from the deep, rock-cut graves within the

ringed enclosure upon the acropolis—presumably those of the ancient princely house—partly from a treasury discovered near by, golden masks, representing rudely the features of the dead; golden breastplates, diadems, necklaces, and buttons; bronze swords, with blades richly inlaid, in variously alloyed gold, with hunting scenes and animal figures; gold plaques stamped with figures of butterflies, squids, and gryphons, or with those of miniature temples with doves perched upon them, symbolic of the oriental Aphrodite (Astarte), or even with that of the goddess herself; engraved rings of gold; vessels of gold, silver, and bronze; a silver ox-head with golden horns; objects of ivory, “Egyptian porcelain,” and alabaster; and, lastly, an ostrich egg, evidently an oriental curio. Nor does this exhaust the list of these remarkable treasures. The objects from Troy are less rich and elaborate, but evidently belong to a similar, in part earlier, civilization; while those found at the other sites mentioned are obviously to be put in the same category with those from Mycenæ. It must further be noted that there were discovered on the acropolis of Mycenæ, above the graves just mentioned, certain tombstones (stelæ) roughly wrought in bas-relief with figures of warriors, which bear a striking likeness to those represented on the gold rings and sword-blades above mentioned. Molds were also found from which certain of the gold objects were formed, thus proving the native manufacture, if not the native character, of the art. From the palace of Tiryns we have a most interesting fragment of mural painting on stucco, representing a running bull and a human male figure. The forms of lions are also of frequent occurrence in remains of this age, not merely in the well-known relief above the gate of Mycenæ, in which the two animals mounted on either side of a curiously shaped pillar constitute a sort of heraldic device recurring on engraved gems from the tombs of the lower town of Mycenæ, as well as on others; but also in those scenes in which lions tear their prey. The pottery found at Troy appears to be the most primitive from the Mediterranean region. Its fundamental forms are simple, and chiefly derived from that of a clay ball hollowed and baked. They are almost all wrought without the lathe and unpainted. Often, instead of handles we find merely “ears” perforated for cords for suspension. Their ornamentation, which follows no system, consists of linear forms scratched upon the clay—the most simple “geometric” decoration so called. We observe in the shape of the vessels rude imitations of animals and of the human figure. Such oddities as vases of several bodies with but one mouth, or vice versa, occur. To this primitive ceramic art the oldest Cyprian vases offer a close analogy. There are few or no traces of foreign influence in this pottery. The primitive vases from Thera (of at least 1000 B.C.) and other Ægean islands, as Paros, Naxos, Ios, Amorgos, Melos, and Syra, appear to represent a later development. These are all wrought with the wheel, are intended to stand, not to be suspended merely (as is the case with most Trojan pottery), and the decorations are painted, not scratched in. Rough imitations of plants appear upon them; not conventional types, but direct imitations of nature. We have also some special ornaments (suggesting, perhaps, oriental metal work) and animal figures. This ware is of native manufacture, as proved by the clay, and seems to form a transitional class between the primitive pottery of Troy and Cyprus, and the more advanced technique of the Mycenaean vases. The older ware of the latter class is unglazed, but what seems justly to be considered the later type has a brilliant glazed coloring. In this, whether it be a Mycenaean invention, as has been claimed, or not, “a completely new factor” enters the history of art. The decoration of Mycenaean pottery is not of a “geometric” pattern, but consists of representations of marine animals, water plants, and waves, with various spiral devices. We shall have occasion to consider this ware in its further relations in the sequel. The architecture of this period, if not of a still earlier as well, is observable in the huge walls of Tiryns and Mycenæ, and at numerous other places in Greece proper, Asia Minor, and Italy (the so-called “Cyclopean” architecture). This is likewise to be seen in the curious beehive-shaped tombs (tholi) at Mycenæ (lower town) near the Heræum of Argos, at Orchomenus, and at Menidi. A principle of construction which these tombs present in common with the fortifications of Tiryns, consists in a vault formed by ascending courses of stone converging to an acute angle. This occurs frequently on the Cyclopean architecture elsewhere. An important point of contact between these monuments and our literary source for the period, the Homeric poems, is presented in the palace structures, the plans of which have been accurately drawn from the foundation-remains at Troy, Mycenæ, and Tiryns, and which appear to coincide with the Homeric descriptions of royal buildings. Hitherto iron objects of this period have been discovered in scanty number only in the more unpretentious rock-cut tombs of the lower town of Mycenæ. To these finds must be added the results of investigations in the Ægean islands, particularly in Thera, where remains of dwellings with primitive mural decoration and of antique pottery (previously mentioned) have been found beneath a deposit of lava, the result of an eruption not later than 1000 B.C.; in Crete, where the ruins of the many great cities mentioned in Homer still await exploration, and where most valuable figured shields of bronze, as well as huge earthenware sepulchral urns have lately been discovered; and in Phrygia and the adjacent regions of Asia Minor, where rock-cut tombs and reliefs present (notably in the form of the lion device) obvious points of comparison with the remains of Greece (particularly Mycenæ), adding weight to the ancient tradition which tells how the walls of Mycenæ were the work of Lycians, and shedding light upon the other legends connecting the Argolid with Asia Minor.

An adequate discussion of these monuments of early civilization in the Greek world is not possible here, but their probable relation to the older culture of the East, as well as to the later Hellenic art, must be pointed out. The unfathomably ancient civilization of the Nile valley and that of the Semitic peoples dwelling about the head of the Persian Gulf certainly acted upon the inhabitants of the Ægean islands and the coasts of Asia Minor and Hellas, who were of Indo-European origin and of more recent development. The details of this process cannot as yet be adequately determined. Leaving out of account the vexed question of the Hittite civilization of Asia Minor from Carchemish on the Euphrates, we may say that those famous early navigators, the Phœnicians, who, occupying an intermediate position between Egypt and Mesopotamia, absorbed elements from both these fruitful sources, and who traded through the length and breadth of the Mediterranean and beyond, certainly brought in much to the early Ægean peoples. This would naturally take place largely through the islands, and Crete appears to have played a prominent part in the process. It has also been already implied, in speaking of Phrygia, that much came overland by another way to the seaboard of Asia Minor, and from thence passed over the Ægean. But these influences from without of an older civilization could never have given rise to a great culture among the Indo-European tribes (Pelasgians, Carians, Leleges, or Achæans, or, later, Dorians and Ionians), to whom they were brought, had there not existed vigorous native genius to be fertilized by them, and to bring new creations to birth. Traces of such primitive native elements (possibly Pelasgian) have been sought, not without probability, in the early engraved gems (the so-called "island-stones," from the fact that many have been obtained from the Ægean islands, though the richest recent finds have been made at Mycenæ and Bapheion), the figures rudely represented on which seem to present, besides Oriental types, e.g., those of the Ægypto-Phœnician scarabæi and of the Babylonian cylinders, certain traces such as horse figures, representations of the Prometheus-myth (the Indo-European fire legend), and certain monstrous forms that are not of a Semitic or Egyptian character. It has been well said that "the Greeks borrowed from the Asiatics the writing of art; but in art too [as well as in literature] they spoke from the beginning their own language." This, though applicable rather to the next and succeeding periods, seems also true in a certain degree of that with which we are here dealing. We shall have to consider it further in the sequel. It may be questioned whether we can truly say that the art of this period perpetuated itself in Hellenic art strictly so called. The Achæan civilization, represented by "gold-rich Mycenæ," as the Homeric epic justly terms it, was overflowed by the tide of Dorian conquest; but the decorative elements and influences in certain well-established oriental types (sphinx, lion, gryphon, siren, and various patterns and motives derived from the Egyptian lotus and the Assyrian palm) we find carried on constantly and undergoing development in the later art. But Greek architecture and sculpture, properly so called, are in their greater and nobler features yet to be developed.

Literature.—Schuchhardt, *Schliemann's Ausgrabungen im Lichte der heutigen Wissenschaft*, 1890 (the best résumé of the subject); [English translation, edited by Leaf, London (Macmillan), 1891.] Milchhoeffter, *Anfänge der Kunst in Griechenland*, Leipzig, 1883 (a thorough and scientific discussion of the subject); Mitchell, *History of Ancient Sculpture*, I., Chap. X. (where Milchhoeffter's work is summarized); Baumeister, *Denkmäler des classischen Alterthums*, articles: Mykenai, Tiryns, Kyklopenbau (admirably illustrated); *Journal of Hellenic Studies*, Oct., 1890, art. by Flinders-Petrie, "The Egyptian Bases of Greek History," from which we make the following extracts: "The whole of the early civilization of the Peloponnese, commonly now known as the Mykenæ period, is a branch of the civilization of the bronze age in Europe, with but little contact with the East. Gaul, Hungary, Italy, Greece, and Libya all enjoyed a simultaneous civilization, which brought these countries far more into contact with one another than with the Asiatic lands which played so great a part in the later-Greek culture" (ib., p. 276). "The general results of my excavations, from the Greek point of view, then are: (1) That we have dated the Greek pottery to within a generation as far as 600 B.C. (at Naucratis); (2) that we have dated it to within a century as far back as 1400 B.C.; (3) that we have tangible remains of the Greek or Libyo-Akhaian invasions of Egypt as far as this period; and (4) that we have pushed back the hazy and speculative region to before 2000 B.C., and shown reasons for looking to a rise of European civilization before 2500 B.C." (ib., p. 277).

II. EARLY HELLENIC PERIOD.—The dark age, from the Dorian invasion to the rise of sculpture in the 7th century B.C., is bridged, from an archæological point of view, chiefly by the painted vases, the earliest varieties of which have been already mentioned. Though the chronology of this class of monuments labors under much uncertainty, it will be of advantage to summarize the results of recent investigation for the whole of the period under consideration before taking up the other archæological monuments included in it.

The funeral urns and other representatives of the so-called "Dipylon-style" (from the Dipylon gate of Athens, in ancient tombs near which the finest specimens of this class have been discovered) appear to extend over a period from about 1000 B.C. to the 7th (or 6th?) century B.C. The patterns upon this pottery are "geometric," derived from carving and textile fabrics, rather than from nature, as in the Mycenæan ware. The human and animal figures upon them are eminently schematic and conventional. Figures of nautical scenes (sea-fights and the like) are prominent. The figured examples

are naturally of later date than those with merely a geometric pattern. This pottery shows little trace of oriental influence. It is not improbable that Athens was the seat of its manufacture.

Closely connected in style and place of manufacture with the Dipylon ware seem to be the "Phalerum-pitchers," and we find a further development in primitive Attic hydrias (water-pitchers) and amphoras of the 7th century.

What may be called the second class of Cypriote vases shows abundance of oriental forms, and doubtless belongs to the time of Phœnician domination on the island. Later we seem to find vessels imported from Greece predominating in Cyprus.

A class of Rhodian vases, apparently contemporary with the later Dipylon and Phalerum-ware is also strongly oriental in decoration, notably in the lotus-pattern surrounding the foot of the vases. Platters (pateræ) and pitchers are the favorite forms of this ware. In the former the influence of Phœnician metal bowls may perhaps be discerned. The earliest inscribed piece of Greek pottery seems to be a Rhodian patera of the end of the 7th century. We have in this vessel the earliest figures distinctly to be assigned to the Epic cycle of myths, of which the influence soon becomes so overpowering in Greek art. Rhodian ware was exported to Cyprus, Africa (Naucratis), Sicily, and Italy (Etruria). Its manufacture seems to have been carried on chiefly in the 8th and 7th centuries B.C.

Certain Melian vases of similar fabric seem to belong to about the same period. They are chiefly amphoræ. On one we have apparently the earliest figures of Greek gods (Apollo and Artemis) in Greek ceramic art.

The earliest master's signature is said to be that of Aristonophos (or Aristonothos) on an ancient vase from Etruria, on which is represented the blinding of Polyphemus.

The Naucratis factory seems to be represented by a small class of gayly decorated vases of similar texture to the Rhodian and Melian. They are assigned to the 6th century B.C.

In the same century are also to be placed the vases assigned to Cyrene, of which the best known is that representing the Cyrenæan king Arcesilas. The prevailing form is the cylix (a saucer with foot and handles). These vessels may be classed as black-figured—that is, as coated over their undecorated portions with a black glaze, the figures being represented in black glaze on a light ground, the surface of the original clay being covered with a light-colored coating. The figures in such ware are detailed with fine engraved lines, often produced apparently with the diamond-point.

The so called "proto-Corinthian" vases (a name not intended to denote their place of manufacture, but rather their relation to later ware) form an interesting class, chiefly lecythi (oil-pitchers). The most beautiful example is the "Macmillan vase" in the British Museum. (Cf. *Journ. Hell. Stud.*, April, 1890.) This ware seems to have been dying out at the end of the 7th century.

The "Corinthian" style, represented by the "Dodwell vase" and a host of other examples, is strongly oriental in decoration, perhaps through the influence of oriental metal-work and woven fabrics, to which Corinth, from its geographical and commercial position, would be particularly subject, although it may be doubted whether the term Corinthian for this ware as a class is precise. It is marked especially by monotonous bands or friezes of animal figures with no internal relation. Among the forms of the ware are to be noted numerous aryballi (globular ointment-pots). We may date this ware in the 7th and 6th centuries.

Certain so-called "Chalcidian," "Ionic," "Cæretanian," and "Bœotian" vessels, with others of still more uncertain category, seem to belong also to this period.

The beginnings of the later Attic ware are to be referred to the 6th century, and consist of black-figured vessels, chiefly amphoræ, on which the glaze is of that peculiar hardness, brilliancy, and blackness, which is familiar in all Attic pottery of this style. We shall have occasion to consider it further in the following more distinctively Attic period.

Painting in Greek archæology can hardly be separated from ceramics, architecture, and sculpture before the time of Polygnotus (5th century). We therefore take up next the consideration of these two latter developments.

The history of the origin of Hellenic architecture rests largely upon conjecture and reasoning from analogy. Although in its development, as known to us from existing monuments, we have to deal with it as manifested chiefly in temple-building (private dwellings being of comparatively little account among the Greeks), it is plain that we have to seek for its primitive principles in domestic structures, which were, doubtless, primarily of wood. The point, however, which chiefly concerns us in this place, leaving fuller details to be discussed under the separate head of architecture, is the rise of the two great orders, connected, as their names imply, with the two great branches of the Greek race—the Dorians and the Ionians. The main distinguishing marks of these orders are to be found in the form of the columns employed; and it is to these that we must turn our attention here, leaving the discussion of the several varieties of temple, whether *in antis* (with the front recessed and columns between the projections of the side-walls), prostyle (with columns across the front), amphiprostyle (with a front at either end), or peristyle (surrounded by columns), as well as the details of the architrave and roof, for another place.

The Doric column, such as we find to have been employed in the Heræum at Olympia, in the old temple at Corinth, and in those of Selinus, as well as in other buildings of this and the succeeding periods, and which is traceable to the 7th century B.C., is characterized in general by the absence of a distinct base, (though this seems clearly to have been an original element of this species of column), by an outward sweep at the top called the echinus, and by a square plate (the abacus) between the echinus and the architrave, as well as by the division of the circumference of the shaft by successive chamferings to a series of flat longitudinal surfaces, in number multiples of four (up to thirty-two), which surfaces are again hollowed, so that the shaft presents the appearance of a circumferential succession of shallow rounded grooves separated by sharp arrises. The nearest prototypes of this form of column, which is marked, particularly in the oldest examples known to us, by great heaviness of proportion, seem to be Egyptian, although Doric architecture offers a new element in the entasis (or slight bulge) in the shaft, which serves to correct a familiar optical illusion.

The Ionic column, on the other hand, which is of lighter and more ornamental design, has always a distinct base with a succession of moldings above it, while the grooves in its shaft do not meet in arrises, but are separated by flat bands. Its chief point of interest, the capital, consists of double spirals, parted in the earlier forms by a palmette device. Over the origin of this form of capital much has been written; and although the question is not as yet settled, it is certain that it goes back to an oriental prototype, whether a conventionalized Assyrian palm-form or a derivative of the Egyptian lotus. *Vid. Amer. Journ. Arch.*, 1886, pp. 1-20, "A Proto-Ionic Capital," J. T. Clarke; *ib.*, pp. 267-285, "A Doric Shaft and Base found at Assos," same author (containing a full bibliography of the subject in both articles); Goodyear, *ib.*, 1887, pp. 271 sqq. (an attempt to derive all palmette, as well as lotus-patterns from the Egyptian lotus).

The Corinthian capital, with its acanthus leaves, so extensively used by the Romans on account of its more elaborate character, may be considered a variety of the Ionic influenced by metal-work. It was little used in strictly Greek architecture. (Cf. Baumeister, *op. cit.*, art. *Baukunst*, with the authorities there cited.) The question of the decoration of the pediments, metopes, and friezes of the temples and monuments of similar structure brings us to the consideration of sculpture.

Sculpture, in the stricter sense of work in the round, cannot be accurately traced in its earliest beginnings on Greek soil. Nor can we say definitely that it took its rise either in the molding of figures from clay or the carving of them from wood, bone, or the like, exclusively. We have noted the great antiquity of the potter's art, and mentioned clay vessels of rude human shape from Troy. We also find shapeless fetiches of wood and stone venerated in various parts of Greece down to the 2d century A.D., and later. A step beyond this primitive worship brings us to rude cultus-statues of wood and stone.

The accounts of the mythical Dædalus, who evidently stands to Greek sculpture much in the same relation as Homer to Greek poetry, give us but hints, which must be supplemented and corrected by such early monuments as we possess. To a certain extent we must accept with Winckelmann a theory of the independent rise of sculpture among the Hellenes. But we should expect the same oriental influences to manifest themselves here as in the case of ceramic art; and when we look to the early statues themselves, such as the various so-called Apollo-figures of the 7th and 6th centuries (typical is the famous "Apollo of Tenea" in Munich), we seem to find unmistakably Egyptian elements. The angularity of the figure, the heavy masses of hair, the high set of the ears, the advancement of the left leg in such statues are unmistakable reminiscences of Egyptian works, with which the Greeks were especially brought into contact about this period. On the other hand statues like the Hera of Samos and other closely draped female figures, with the feet just appearing below the drapery, may be compared with the seated statues from Branchidæ, in the British Museum, and with what seem to be their older Chaldaean prototypes from Tello. Statues like the Hera have the aspect of being modeled after wooden figures.

The series of works of archaic sculpture from the period under discussion has rapidly increased through recent excavations, and we are able to trace with tolerable clearness the attempts made by the vigorous Greek artists to gain increased naturalness and lifelikeness in their figures, while gradually acquiring the full mastery of material and technique requisite for the free exposition of the sculptor's ideal.

To the opening of the marble quarries of Naxos and Paros we owe much. The marble thence obtained is a wonderfully fit material, easily worked, and in its very hue imitating human flesh. Prominent among the artists who worked in this marble we find Micciades and Archemus of Chios, members of an artist-family mentioned by Pliny, and now known to us by inscriptions as well as by certain archaic works of the 6th century.

Of inestimable value for the study of the sculptures of this period are the archaic statues discovered on the Acropolis of Athens, which certainly antedate (how much we cannot say) the Persian invasion of 480 B.C. The tyranny of Pisistratus in the 6th century certainly formed an epoch in the artistic as well as literary life of Athens, only to be paralleled by the Periclean age. The full comparison and discussion of these remarkable works, with their elaborate polychrome decoration, together with the history

of early Attic art, still remains to be written. (For an account of the painted decoration of some of the female statues cf. an illustrated article by Russell Sturgis, in *Harper's Magazine* for September, 1890.)

But the development of the period was not confined to Attica alone, nor merely to sculpture in the round. The pedimental groups of the gigantomachy from the Megarian treasure-house at Olympia, and of Heracles and the hydra from the Acropolis of Athens, wrought in high relief from poros, a sort of tufa, and, like all such work, stuccoed and painted, are also of special note, together with the early metopes of Selinus in Sicily; while the elaborate grave-stelæ of the "Warrior of Marathon" type (stele of Aristion, wrought by Alexenor of Naxos), with complete and minute polychrome decoration supplementing the details of the bas-relief, are the forerunners of the exquisite monuments of the Ceramicus to be mentioned hereafter.

Figures like the winged victory of Archermus, and the sphinx, if not also the lion, show the influence of the East, particularly of the Asiatic orient, in the sculpture of this epoch. But we feel, in contemplating the Acropolis statues, that we are on Greek ground, and that the artists are rapidly bringing in a nobler native art.

We have hardly entered upon the list of these important monuments; but it must suffice for this place to have indicated to some degree their relations, and we now pass to the mention of the kindred class of bronze works.

Together with the rude terra-cotta dedicatory figurines of early workmanship, we find also many small bronzes which exhibit a gradual development from the rude and primitive to the delicate and refined. An elaborate and truly remarkable technique, however, is manifested in such consummate works of archaic Greek art as the bearded bronze head found on the Acropolis, or the similar head of Zeus from Olympia. We see in such works the links in a chain extending back to those legendary metal-workers, the Dactyls of Crete and the Telchines of Rhodes, and forward to the glories of the Argive-Sicyonian school.

To the period under discussion belongs another development in metal-work, namely, the minting of coins. The earliest coins, properly so called, seem to date from about the beginning of the 7th century, and to have been struck by the Lydian monarchs (possibly first by Gyges). Their material is electrum or "white gold," a native alloy of gold and silver in about the proportion of 3:1. The standard of weight adopted seems clearly to be of Babylonian origin, and to have come overland to the seaboard of Asia Minor. Phidon of Argos, a tyrant of uncertain date, but not earlier than the 7th century, is said to have been the first to issue coins among the Greeks, Ægina being the seat of their mintage, and the name "tortoises" being bestowed upon them from the figure on the obverse, the reverse (which was the side struck by the upper die in minting) having upon it the familiar "incuse-square," or punch-mark so prevalent in archaic coinage. The tortoise was one of the animals sacred to Aphrodite (Astarte), and we find other evidence that we have here a trace of Phœnician commercial intercourse with the Peloponnese. The Æginetan standard of weight differing from that of the Lydian coinage, but also seemingly of Babylonian origin, appears to have been introduced overseas by the Phœnicians.

In Greece proper sprang up, subsequently to the Æginetan, a coinage at Corinth, the so-called "colts," from the Pegasus on the obverse, and at Athens the so-called "maidens," or "virgins," from the Athena-head of the obverse, or "owls" from the type of the reverse. We see in all these types a sacred symbolism which continues unbroken in coinage till the Macedonian period.

The greatest Greek cities in this early period were the Achæan colonies of Magna Græcia, foremost among which was Sybaris, afterwards overthrown by her great rival Croton. The coinage of the Achæan confederacy, which seems to have existed in this region, is far superior in artistic workmanship to that of Eastern Hellas, and is distinguished by having, instead of an incuse-square on the reverse, an incuse type, generally the same as that of the obverse (Posidon, bull, boar, etc.).

Sicilian coinage, notably that of Syracuse, which in the 5th and 4th centuries reached so high an artistic position, also began in the 6th century.

All the coinage here mentioned, except the Lydian, is of silver. (For a full discussion of ancient coins, with exhaustive bibliography, consult Head's *Historia Numorum*, Oxford, 1887; also particularly Percy Gardner's admirable *Types of Greek Coins*. The period here outlined corresponds to Head's archaic period, 700—480 B.C.)

The minting of money became gradually diffused through the Greek world, so that there was hardly a town of any consequence without a coinage; some towns being known to us only from their coins.

Intimately connected with die-cutting is gem-engraving, for the details of which see the work of Middleton, *The Engraved Gems of Classical Times*, (Cambridge, 1891).

[On vases cf. the article "Vasenkunde" in Baumeister, *op. cit.*]

III. PERIOD OF HELLENIC PRIME.—The period which we now enter upon is naturally subdivided by that great convulsion of the Greek world, the Peloponnesian War (431—404 B.C.), into an earlier and a later half, in which diverse social and political influences are at work, wherefore it will be of advantage to keep this subdivision in mind. The most noteworthy development of this time for us is that of sculpture and statuary, the great monuments of the painter's art having irretrievably perished.

About the beginning of this epoch we find bronze-casting by the so-called "cire perdue" method (a model of clay being coated with wax more exactly to the artist's ideal, the whole covered with clay, and the molten metal let into the baked form in the place occupied by the wax) which seems to have been carried to a high degree of perfection. The statues of Harmodius and Aristogiton at Athens by Antenor seem to have been of bronze. But bronze statuary was practised notably by the so-called Argive-Sicyonian school, successors of a line of native artists, and connected with the mythic Dædalids Dipenus and Scyllis, who, according to Pliny, came to Sicyon from Crete, and were the first sculptors in marble. We find Ageladas of Argos, and Canachus of Sicyon famous as statuaries in bronze about the end of the 6th century. Gold and ivory (in the famous chryselephantine work) and marble were more popular in Attica. Pythagoras of Rhegium (the author of the limping Philoctetes), and Calamis and Myron among Attic artists, the latter famed for his Discobolus and bronze cow, are the forerunners of Phidias in the development of the great art of the 5th century. We may also mention Onatas, who is perhaps to be strictly connected with one of the Æginetan pedimental groups.

Greek sculpture, however, reached its highest ideal development, though not its full legitimate growth, in Phidias, son of Charmides and pupil of Ageladas of Argos, the companion and friend of Pericles, the superintendent of the Parthenon sculptures, and the artist of the chryselephantine Athena Parthenos, as well as the creator of the highest anthropomorphic type of Greek religion in the great chryselephantine Zeus at Olympia, of whose calm and marvelous beauty and dignity we can now, unfortunately, gain but feeble conception. (Cf. Waldstein, *Essays on the Art of Phidias*.)

We have noticed Phidias's activity in connection with the Parthenon, but we must not leave unmentioned the other great buildings of the time, the Propylæa, the so-called Theseum, the Erechtheum, the temple at Eleusis, and that at Rhamnus, while a like architectural activity was going on across seas in Ionia, Sicily, and Magna Græcia.

Painting as a great and independent art was developed contemporarily with Phidias, by Polygnotus of Thasos, whose paintings in the lesche (portico) at Delphi have been fortunately described to us by Pausanias. He must have powerfully influenced the art of the ceramic-painters, as we seem to be able to trace in their works. After him may be mentioned Agatharchus of Samos, Apollodorus, the first painter of pictures in the more modern sense (i.e., on flat, movable surfaces, anciently not of canvas but of board), Zeuxis, the contemporary of Socrates, whose Centaur-family is minutely described to us by Lucian, and Parrhasius of Ephesus.

At the beginning of the 4th century must be mentioned Timanthes of the Sicyonian school, the painter of the celebrated sacrifice of Iphigenia. But we must leave undiscussed all details in regard to the work of these artists for lack of sufficient monumental data.

The work of the Argive-Sicyonian school was carried forward by Polyclethus, the author of the Doryphorus (spear-bearer) and Diadumenus (youth binding on head-band), and who established a canon of proportion characterized by a certain squareness and heaviness. To him is ascribed an advance in the statuary's art in that he caused his figures to rest upon one leg, thus easing the pose and producing greater grace of attitude and freedom of outline.

After the stormy period of the Peloponnesian war we find Cephisodotus and his famous son Praxiteles carrying out Greek plastic art to its legitimate and logical conclusion, and to its fullest bloom and perfection. The Irene with the baby Plutus preserved in Munich, a replica of a work of Cephisodotus, is a gracious and lovely figure; but Praxiteles's marble Hermes with the baby Dionysus, found in the place designated by Pausanias, the Heræum at Olympia, in exquisite sensuous beauty, in perfection of manly strength and grace, and in the combination of the divine ideal with human form, as well as in complete mastery of technique, surpasses all that is left us of ancient art, while the pensive expression of the god's face indicates but too clearly the speculative thought that was undermining the old faith. There is no more perfect image of the period than this marvelous statue.

It is to Praxiteles that we are to attribute the development, if not the invention, of languid but not yet effeminate figures, with hand supported on hip, such as the famous Faun, of which several replicas exist, perhaps even the torso of the original. Praxiteles is pre-eminently the sculptor of youthful beauty, not merely in man but also in woman, as proved by his famous Cnidian Aphrodite, inadequately preserved in replicas.

Side by side with Praxiteles must be mentioned Scopas of Paros, whose art seems to have been of somewhat similar character. The remains of his work from the temple of Athena Alea at Tegea do not suffice for an accurate judgment, nor can we certainly attribute to him anything from the temple of Artemis at Ephesus, or from the Mausoleum at Halicarnassus. If it be true, however, as is plausibly maintained, that the influence of Scopas was strongly felt in the Pergamene school, we shall have good ground for adjudging to him the celebrated Niobe-group, about the authorship of which Pliny is uncertain between Scopas and Praxiteles, and for the characterization of Scopas as "the master of the dramatic or ethical pathos," Praxiteles being described as "the master of the psychic pathos and of the complete sensuously beautiful form."

To the first half of the 4th century we may assign those most exquisite funereal monuments, particularly of the Athenian Ceramicus, such as that of Dexileos, and the deeply pathetic relief of Hegeso. This art is markedly Phidian in character.

The growth of the Attic drama in the 5th century brings into prominence the theatre as a form of architecture, the numerous details of the construction of which have not yet been fully settled. It will be sufficient to refer the reader to the excellent work of Haigh, *The Attic Theatre* (Oxford, 1889).

In ceramics we must consider the Attic development, which in this period is of absorbing interest, and gives us much light on painting on a larger scale as well as on contemporary manners and customs. The rise of Attic black-figured ware has already been mentioned. As a special form of this we must mention particularly the fine Panathenaic amphoras, with figures of the armed Athena, in which the sacred oil was presented to victors at the Panathenaic games. These vases are interesting as being continued in an archaistic form into the 4th century. (Cf. Baumeister, *Denkmäler, art. Panathenaia*.) The hydria is also a favorite form in this ware, while the lecythi, interred in such large numbers with the dead, form a noteworthy class. Among painters of black-figured vases may be named Execias and Nicosthenes, the latter represented by nearly 80 vases. (Cf. W. Klein, *Die Griechischen Vasen mit Meistersignaturen*, 2d ed., Vienna, 1887.) A special class of peculiarly Attic vases are the beautiful "prothesis (laying out) lecythi," on which funereal scenes are exquisitely depicted in various colors on a soft white ground. They may be classed historically as the successors of the Dipylon vases, and in art as kindred with the Ceramicus gravestones.

In the "red-figured" ware, which far surpasses in artistic merit the black-figured, and of which the rise as a separate variety seems now to be assigned to the latter half of the 6th century, the figures are merely left bare of the black glaze instead of being relieved in black against a light ground, and then details are touched in with black, white, and various colors. In this variety, in which scenes from the myths, while not excluded, yet make room for delightful bits of social and domestic life and in the development of which the cylix plays an important part, the most noteworthy artists are Euphronius, Duris, Hiero, Macron, Pithinus, and Sosias of the first half of the 5th century.

Various grotesque forms of vases, such as the rhyton (in the shape of a head, generally that of an animal), now come into use, and we find numerous examples of the pyxis or woman's toilet-box. But the art gradually sank, and vase-painting was fast dying out at the beginning of the Alexandrian period.

In the domain of numismatics we must briefly mention the periods of transitional art (480—415 B.C.) and of finest art (415—336 B.C.). We have here not to deal particularly with Athenian coinage, which, like the Panathenaic amphoras, keeps a designedly rude and archaic character in order to maintain its position with foreign peoples, with whom the Attic state came in contact through its wide maritime relations and commercial dealings, but rather with such beautiful work as that of the Syracusan die-cutters Euænetus and Cimon, in the period subsequent to 415 B.C., whose splendid decadrachms are justly reckoned among the highest achievements in this class. We may trace, however, through the coins of this entire epoch that same gradual mastery of material and development from the more severe to the more graceful, which is marked in other lines of art. But coinage still maintains the sacred symbolism which characterized it from the beginning, the purely human and individual element appearing distinctly only in the special marks of magistrates and mint-masters, which are kept subordinate to the main design. (See again Gardner, *op. cit.*)

IV.—PERIOD OF HELLENIC DISSEMINATION AND DECLINE.—The development of Macedonia under Philip and the conquests of Alexander change the entire aspect of the Greek world. We have henceforth to consider a Hellenism synonymous with civilization rather than the geographical Hellas with her outlying colonies.

In Greece itself the greatest influence is exerted at the opening of this period by Lysippus of Sicyon, who not only continued the prestige of the Argive-Sicyonian school, but also introduced a new canon in statuary, making the figure more slender and the head proportionally smaller than in the preceding art, and forming a marked contrast to the canon of Polycletus. Characteristic of his work is the *Apoxyomenos* (a youth scraping himself with the strigil), known to us from replicas. He was also a sort of court-sculptor to Alexander the Great, as Apelles was his painter. His influence extends immediately to Rhodes in Chares of Lindus, one of his best-known pupils, and artist of the famous Colossus of Rhodes.

The Rhodian school, which was justly distinguished during the 3d century, produced among other famous works the Laocoon group, by Agesander, Athanodorus, and Polydorus, to be noted as marking distinctly the new element in sculpture, which, starting apparently from Scopas, emphasizes the pathetic, and well-nigh oversteps the boundary between sculpture and painting. This art is the legitimate precursor of the Pergamene school, presently to be mentioned. It is also connected with the style of such sculptors as Apollonius and Tauriscus of Tralles, the artists of the group called the "Farnese Bull."

The splendid Victory of Samothrace, now in the Louvre, which may be dated about the beginning of the 3d century, is one of the greatest monuments of this period, and deserves to be ranked with such splendid figures as the Victory of Pæonius of Mende, set up at Olympia a century or more earlier, and with the Victories from the balustrade of the temple of Nike Apteros, at Athens.

The Pergamene art, cultivated especially under the Attalid kings, and of which we see such astonishing examples in the frieze of the great altar of Zeus at Pergamon, of the earlier part of the 2d century B.C., representing a colossal gigantomachy, exhibits great mastery of technique, violence of action, and the free expression of physical suffering, the two latter qualities rather of painting. As intimated above, it is the grand finale of Greek sculpture, in which this art still appears great, though overstepping its due bounds.

The Aphrodite of Melos follows rather in the wake of the great idealistic art of the 5th century, and is more Phidian than Praxitelean. The question about the proper restoration of the statue is still unsettled.

We must mention here, in passing, the celebrated Apollo Belvedere, a work of pre-eminent beauty and grace, concerning the history of which we are sadly ignorant.

With the painting of the Alexandrian period we come more closely into contact than with the earlier art in this kind through the wall-decorations of Herculaneum, Pompeii, and Rome, which follow the traditions of this epoch. Apelles of Colophon represents the highest development of Greek painting. His idealized portraits of Alexander were as famous as Lysippus's statues. Protogenes of Caunus, who worked at Rhodes about the end of the 4th century, is also distinguished in this department. Antiphilus at the court of Ptolemy is characterized as "most eminent in facility." But the list of great Greek painters closes with Theon of Samos, also of the 3d century. (Cf. the article "Malerei," in Baumeister, op. cit.)

In another species of art we find the eminent gem-engraver Pyrgoteles, employed by Alexander; and this branch of the sculptor's profession, ever excessively popular among the ancients, was fostered by that monarch's successors.

In vase-painting we note little else than decline, the latest development manifesting itself in Magna Græcia, Etruria, and Campania. The South-Italian painted vases, which present a distinctly funereal element side by side with a marked influence from the drama, give us much valuable archæological material. Assteas (of Paestum?), Pytho, and Lasimus are its only masters known to us by signature. We have also some Campanian vases with Latin inscriptions of the 3d century. The end of vase-painting seems to fall about the beginning of the 2d century B.C.

We may here depart from our chronological order to consider briefly the peculiar ware of Etruria, when, side by side with primitive geometric pottery, continued seemingly over a long period, and more or less skillful imitations of Greek painted ware (particularly Attic), we find the so-called *vasi di bucchero*, a peculiar class of pottery of black clay, about which we have but little exact knowledge, and of which examples have been found not merely in Etruria, but also in the Orient, in Cyprus, in Greece proper, and on the coasts of the Black Sea. The earliest of such vessels in Etruria are made without the lathe, but in the manufacture of the later (and darker) ware the lathe was employed. The earliest figures are scratched in; subsequently relief-decoration appears. In the latter case Greek types are employed, at first roughly, afterwards more skillfully, and with a mold or incised roller. In individual cases polychrome painting occurs. This art seems to have continued into the 6th century.

Before leaving the subject of pottery we must also notice the so-called Samian and Megarian relief-ware, assigned to the 2d century B.C., and the Aretinian ware, apparently of the 1st century B.C.

In numismatics the new development under Alexander and his successors, designated as "the period of later fine art from the accession of Alexander to the death of Lysimachus" (336—280 B.C.), and marked by the influence of Lysippus, is succeeded by a period of decline in art extending to the Roman conquest (280—146 B.C.). Types of sovereigns, first that of the deified Alexander, then those of other and living princes, make their appearance upon coins, and continue down to the later Roman empire a valuable series of historical portraits. Gold coinage now begins to occupy a prominent position, and continues side by side with silver and bronze as a medium of exchange under the Roman empire. (On copper currency, *as grave*, etc., cf. Head, op. cit., pp. 14—17.)

In small art our attention is particularly drawn to the terra-cotta figurines of this period, particularly those of Tanagra in Boeotia, which in their charming shapes and lovely coloring give us so many delightful pictures of Greek life.

Bronze mirrors may also be alluded to here before we pass out of the domain of Greek classic art. Of these some most beautiful specimens exist, their lids forming a class of chefs d'œuvres in metal-graving, while their handles are often statuettes of finest workmanship.

V. ROMAN PERIOD.—The passion of the Roman connoisseurs for objects of Greek art has already been alluded to; but in the period upon which we are now entering certain other elements demand our attention. As among the Greeks, the introduction of foreign art was met by a native element, which at first colored and afterwards completely overpowered by the strength and vigor of its own development external influences; so we find in Italy, among the Etruscans, the masters, in so much, of the Romans, and whose peculiar bucchero-ware has already been mentioned, a native element which reacted upon the art from without, though in a vastly slighter degree than that of Greece and with inferior genius. Their art was not the oldest in Italy; for we find specimens

of *situlae* (pails) of beaten metal, perhaps to be designated as Umbrian, the decoration of which, while it seems to show certain elements derived through the Greeks, has but little affinity with Etruscan art.

The influences at work among the Etruscans were principally Greek, as we have noticed in the case of their figured pottery. The native elements were chiefly their sombre religion, and a marked aptitude for portraiture. We find "realism combined with poverty of style". The chief Etruscan monuments are funereal, consisting of decorated tombs, sarcophagi, and ash-urns, in which Greek ornamentation and Etruscan portraiture are not very happily blended.

The same tendency to portraiture appears among the Romans, fostered by the importance attached to ancestral *imagines* (portraits in wax) which played so marked a part in their funeral ceremonies. Their masters in this were Etruscan artists.

Although we read how the Sicilian artists Damophilus and Gorgasus, as early as 493 B.C., decorated with sculpture and painting the temple of Ceres at Rome, they are stated to have been the first temple decorators there who were not Tuscans; and the Greek custom of erecting consecrated statues to the gods did not come into vogue until after 290 B.C.

Hand in hand with the art of plastic portraiture, in which Roman artists learned from Etruscan masters, went that of honorary statuary in bronze. The beginning of this branch of art is placed about 450 B.C., and after the Second Punic War such statues were to be seen at Rome in large numbers, most Romans of any distinction being honored in this way. It was just after this time that their Grecian conquests began to bring the Romans decidedly under the sway of Hellenic art.

In architecture the markedly Roman feature is the great employment of the arch, which, although not unknown to the Greeks, was but rarely used by them. This rendered possible such great works as the aqueducts, to say nothing of the Colosseum, the Pantheon, and the other huge structures of imperial times. In temple construction we find Etruscan influence at work in the earlier period, both in form and decoration. Later Greek architecture is combined with native elements in elaborate and luxuriant structures.

The so-called Attic Renaissance in sculpture about the beginning of the period we are now considering, i.e., shortly after Greece had become the Roman province of Achaia, introduced no new elements, but carried on with enfeebled ability the old. This revival is best known to us through the Farnese Hercules, an exaggerated work of which the motive is derived from the Pergamene school.

The archaistic school of the 1st century B.C., Pasiteles, a native of Southern Italy, his pupil Stephanus, and Stephanus's pupil, Menelaos, deserves mention as exercising somewhat of independent influence. (Cf. Waldstein in *Am. Journ. Arch.*, 1887, pp. 1-13.)

The most active class of sculptors at Rome in the time of the late Republic and early Empire were from Asia Minor. Best known among such is Agasias, the artist of the so-called "Borghese Gladiator".

From the time of Augustus on we meet, side by side with a vast importation of ancient Greek works and reproductions of them in copies, a host of portrait statues, and busts, triumphal arches and elaborate public and private buildings of all kinds. A most splendid specimen of Roman portrait-statuary is that of Augustus in general's uniform, now in the Vatican. In it are admirably combined grand and realistic portraiture, and rich decorative effects, particularly in the cuirass. Especially noteworthy also are the reliefs of the *ara pacis Augusti* and of the triumphal arches, such as that of Titus.

Of idealistic bronze statuary we have a beautiful example in the Victory of Brescia of the 1st century A.D.

The era of Hadrian is the last period of vigorous impulse in art among the Romans. That emperor's passion for ancient art, both Egyptian and Greek, and his encouragement of new works, both at home and abroad, is well known. To his reign are to be assigned the various idealized portraits of his famous Bithynian favorite Antinous.

In numismatics the last periods of continued decline (146-27 B.C.) and of the coinage of the Roman empire down to Gallienus (27 B.C.-268 A.D.) fall in here. The material is vast, and here, too, the element of realistic portraiture is prominent.

The luxury of the Romans manifested itself in the multiplication of elaborate mosaics, rich jewelry, wonderful intaglios, both in stone and in paste, costly glassware and the like. But of all this art, which cannot be fully discussed here, suffice it to say that it involves no new principles. It is merely the bloom of that decay which was fast consuming the ancient world.

ARCHÆOPTERYX, a fossil bird, a few specimens of which have been found in the jurassic limestone of Solenhofen, Bavaria. It was about the size of a rook, had a tail formed of 26 elongated vertebrae, each supporting a pair of quill feathers, and short wings with 2 free claws. It is probable that the jaws were furnished with sunken teeth, like those of the toothed birds of cretaceous times.

ARCHANGEL (from the Greek prefix *archi-* or *arch-*, denoting chief, and *angelos*, an angel), a term which occurs in the New Testament; and which, according to some, is there a title of our Savior—but according to others, designates an angel superior in power

and glory to the other angels. We read, in the epistle of Jude, of "Michael the A.," and in Rev. xii. 7, of "Michael and his angels." In 1 Thess. iv. 16, we are told that the coming of our Lord at the last day shall be "with the voice of the A., and with the trump of God." We nowhere read in the Holy Scriptures of *archangels*, although the plural is popularly as much used as the singular. The notion of an angelic hierarchy certainly prevailed among the Jews, the highest place being assigned to Michael; and the same notion has extensively prevailed in the Christian church. There are passages of Scripture which seem to indicate different degrees and classes among the angelic hosts, but no clear revelation has been made upon this subject. See ANGELS.

ARCHANGEL, the chief city in the Russian department of Archangel, is situated in lat. 64° 32' n., and long. 40° 33' e., about 40 m. above the junction of the river Dwina with the White sea; is the seat of an archbishop, and contains about 18,000 inhabitants. Its name is taken from the monastery of St. Michael. A. is the chief commercial city for the north of Russia and Siberia, and is visited by numerous vessels — especially British — from July to September, the port being clear of ice only during that period. The houses are built chiefly of wood; and their general appearance is far from handsome. The finest edifices are the bazaar or mart, and the marine hospital. A. has an ecclesiastical college, schools for engineering and navigation, etc. The chief articles of traffic are fish, train-oil, skins, furs, timber, wax, iron, tallow, bristles, caviare. The t., which is the oldest seaport of the empire, and was for a long period the only one, was founded in 1584. Its merchants trade as far e. as China, and have all the commerce of Siberia. During summer, A. has a continual market.

ARCHANGEL, or **ARKANGELSK**, a government and city of Russia; the government between 61° and 71° n., and 29° to 68° e., along the White sea and Arctic ocean, and including the island of Nova Zembla; 331,505 sq. m.; pop. '92, 354,411. The n. part is sterile, and its winters are severe. Below the arctic circle are extensive forests, lakes, and morasses. The spring is moist, with cold frosty nights; summer has long, foggy days, and the autumn is short and moist. The wealth of A. is in its forests. Gold, naphtha, salt, coal or lignite, and sulphur springs are found. The productions are pitch, tar, tallow, turpentine, potash, cordage, mats, and leather.

ARCHANGEL, New. See SITKA.

ARCHBISHOP (Gr. *arch-*, and *episcopos*, overseer) is the title given to a metropolitan bishop who superintends the conduct of the suffragan bishops in his province, and also exercises episcopal authority in his own diocese. The title arose, in the 3d and 4th centuries, from the provincial synods being held once or twice a year in the chief t. of the province under the presidency of the bishop of the place. Another cause of the origin of the title is said to be the custom of planting new bishoprics as Christianity spread, a slight supremacy being still retained by the original over the newly-appointed chief pastors. In the oriental church, the archbishops are still called "metropolitans," from the circumstance first mentioned. In the African church, on the other hand, the term used was "primus." The great archbishoprics of the early church were those of Jerusalem, Antioch, Ephesus, Alexandria, Constantinople, and Rome. Since the 6th c., the A. of Rome has assumed the name of pope (papa). There is an official letter by Justinian, addressed to "John A. of Rome and patriarch;" and several ecclesiastical constitutions are addressed to "Epiphanius A. of Constantinople and patriarch." The synod of Antioch, in 341, assigned to the A. the superintendence over all the bishoprics, and a precedence in rank over all the bishops of the church, who, on important matters, were bound to consult him and be guided by his advice. By degrees there arose, out of this superiority of rank, privileges which at length assumed the character of positive jurisdiction in ecclesiastical matters. Many of these rights passed to the patriarchs (q. v.) towards the end of the 4th and during the 5th centuries, and still more to the pope in the 9th. The archbishops still retained jurisdiction, in the first instance, over their suffragans in matters which were not criminal, and over those who were subject to them they acted as a court of appeal. They possessed also the right of calling together, and presiding in, the provincial synods; the superintendence and power of visitation over the bishops of the metropolitan see; the power of enforcing the laws of the church; the dispensation of indulgences, and the like. The archbishops further enjoyed the honor of having the cross carried before them in their own archiepiscopate, even in presence of the pope himself, and of wearing the *pallium*. In England, there are two A., of whom the one has his seat at Canterbury, the capital of the ancient kingdom of Kent; the other at York, the capital of Northumbria. But though, as ruling over a province in place of a single diocese, both have enjoyed the rank of metropolitans from the first, the A. of Canterbury has all along enjoyed, not merely precedence as the successor of Augustine and the senior A., but as possessing a pre-eminent and universal authority over the whole kingdom. This pre-eminence is marked in the titles which they respectively assume—the A. of Canterbury being styled the primate of all England (*metropolitanus et primus totius Angliæ*), whilst the A. of York is simply called primate of England (*primus et metropolitanus Angliæ*). It is also indicated by the places which they occupy in processions—the A. of Canterbury, who has precedence of all the nobility, not only preceding the A. of York, but the lord chancellor being interposed between them. Previous to the creation of an archbishopric in Ireland, the authority

of the A. of Canterbury extended to that island. The amount of control which belongs to an A. over the bishops of his province is not very accurately defined; but if any bishop introduces irregularities into his diocese, or is guilty of immorality, the A. may call him to account, and even deprive him. In 1822, the A. of Armagh, who is primate of all Ireland, deposed the bishop of Clogher on the latter ground. To the A. of Canterbury belongs the honor of placing the crown on the sovereign's head at his coronation; and the A. of York claims the like privilege in the case of the queen-consort, whose perpetual chaplain he is. The province of the A. of York consists of the six northern counties, with Cheshire and Nottinghamshire. The rest of England and Wales form the province of the A. of Canterbury. The dioceses of the two A.—that is to say, the districts in which they exercise ordinary episcopal functions—were remodeled by 6 and 7 Will. IV. c. 77. The diocese of Canterbury comprises Kent, except the city and deanery of Rochester, and some parishes transferred by this act; a number of parishes in Sussex called “peculiars,” with small districts in other dioceses, particularly London. The diocese of the A. of York embraces the co. of York, except that portion of it now included in the dioceses of Ripon and Manchester; the whole co. of Nottingham; and some other detached districts.

In Ireland there are two Protestant and four Roman Catholic archbishops. Of the former, the A. of Armagh is primate of all Ireland; the A. of Dublin being primate of Ireland. They formerly sat alternately in the house of lords; the three bishops who, along with them, represented the church of Ireland, being chosen by rotation. The election of an A. does not differ from that of a bishop (see BISHOP), but when he is invested with his office, he is said to be “enthroned,” whereas a bishop is “consecrated.” He also writes himself, “by divine providence;” a bishop being, “by divine permission,” and has the title of “grace,” and “most reverend father in God,” whilst a bishop is styled “lord,” and “right reverend father in God.” The A. is entitled to present to all ecclesiastical livings in the disposal of diocesan bishops, if not filled up within six months; and every bishop, whether created or translated, was formerly bound to make a legal conveyance to the A. of the next avoidance of one such dignity or benefice belonging to his see as the A. shall choose.

The only archbishops in the U. S. are those of the Roman Catholic church, now 14 in number. Up to 1789 the ecclesiastical government of that church in this country continued under the vicar apostolic of the London (England) district, the local superior being father John Carroll, of Baltimore. In 1789 Baltimore was erected into an episcopal see, and father Carroll became bp. In 1808, after New Orleans, New York, and Boston had been erected into sees, Baltimore was raised to metropolitan rank, father Carroll becoming the first archbishop, as he had been the first bp., in this country. The dates of the establishments of other archiepiscopal sees in this country are as follows—the first date being that of the foundation of the see, and the second of its elevation to a metropolis: Oregon City, 1846, 1846; St. Louis, 1826, 1847; New Orleans, 1793, 1850; New York, 1808, 1850; Cincinnati, 1821, 1850; Dubuque, 1837, 1893; San Francisco, 1853, 1853; Milwaukee, 1844, 1875; Boston, 1808, 1875; Philadelphia, 1808, 1875; Santa Fé, 1850, 1875; Chicago, 1844, 1880; St. Paul, 1850, 1888.

ARCHDEACON (Gr. *arch-*, and *diaconos*, servant). An ecclesiastical dignitary whose jurisdiction is immediately subordinate to that of the bishop. The A. originally was simply the chief of the deacons, who were the attendants and assistants of the bishop in church affairs. His duties consisted in attending the bishop at the altar and at ordinations, assisting him in managing the revenues of the church, and directing the deacons in their duties. From being thus mere assistants, archdeacons in the 5th c. began to share the bishop's powers, and step by step attained to the authority which they now enjoy, which from the 9th c. became in many respects distinct from that of the bishop. Several synods protested against the innovation, but it was continued in the 11th and 12th centuries, when the archdeacons were recognized as the most influential of prelates. In the 13th c., their powers were limited by the establishment of episcopal courts. Their dignity and influence is now very much reduced in the Catholic church. There were formerly 60 archdeacons in England, but their number has been considerably increased since the passing of the act for carrying into effect the report of the ecclesiastical commissioners (6 and 7 Will. IV. c. 77); and it is probable that under the provisions of that act they may be still further increased. No person can be appointed an A. till he has been six years complete in priest's orders (3 and 4 Vict. c. 113, s. 27). The duty of parochial visitation has long been regarded as belonging specially to the archidiaconal office, and it was by its exercise mainly that the archdeacons attained to the dignity of ordinary instead of delegated jurisdiction. Even in performing this function, however, and in holding general synods or visitations, ordering repairs of churches, and the like, the A. is properly to be regarded as being what the canon law called him, “the bishop's eye.” The judge of the A.'s court, when he does not preside, is called “the official.” There is an appeal to the court of the bishop, or in the case of an A. of an archbishopric, to the court of arches. See DEACON, DEAN, PRIEST. In the American P. E. church, the archdeacon acts as the agent of the bishop in visiting and reporting upon the condition of the parishes.

ARCHDUKE. A. and archduchess are titles now taken by all the sons and daughters

of the emperor of Austria, and by their descendants through the male line. The title of A. was gradually assumed by the dukes of Austria, as a mark of precedence over the other dukes of the empire. Duke Rudolph IV. of Austria, in 1359, called himself Palatinus Archidux, but he was not so styled by the emperor. His brothers, Albert and Leopold, did not assume the title after his death, though they had occasionally done so in his lifetime. The third son of Leopold, however, Ernest-the-Iron, revived it. Still he was addressed by the emperor simply as duke. At last the title was formally conferred on them by the emperor Frederick III. in 1453, who himself, as duke, was the first recipient of the imperial gift. Still the usage was not uniform, for he afterwards speaks of himself as duke. The privilege was extended to the Tyrolian branch of the Austrian house in the person of Sigismund. The value of the dignity thus assumed was a cause of contention with Bavaria in 1589. The Austrian view was that to duke it held the same relation that archbishop does to bishop. The dukes of Austria claimed to have always had precedence over the other ducal houses, and regarded the title as a mere indication of what had been universally acknowledged. Bavaria, on the other hand, relied on the greater antiquity of its dukedom. The contest was decided by the emperor Rudolph II. in favor of Austria, the precedence of which has not since been called in question. Other dukedoms claimed the privilege of being so called, but it was invariably denied by the emperor.

ARCHEDEMUS, or **ARCHEDAMUS**, whose nickname was *Γλάυων*, the bleary-eyed, was a foreigner who by fraud obtained the franchise at Athens. He appears to have been the Archdemus mentioned in Xenophon's *Memorabilia*, who rose from obscurity to an influential position by means of his talent for public business and oratory. After the battle of Arginusæ, B.C. 406, he led the public disaffection against the six Athenian generals, by imposing a fine on Erasinides.

ARCHEGOSAU'RUS, a remarkable fossil saurian reptile, so named by Goldfuss (*archēgos*, leader; and *sauros*, lizard), as constituting the real beginning of reptilian life, which had previously been considered as not extending below the permian series of rocks.

The skull is flattened and triangular, with rounded angles, the front one being somewhat lengthened. The teeth are simple cones, having a labyrinthic structure similar to that of the recent *lepidosteus*. The vertebral column remains in an embryonic condition; the arches and peripheral elements of the vertebrae are ossified; but the *chorda dorsalis*, which is persistent, is unprotected below. The ribs are short and almost straight, round and slender in the middle, expanded and flattened at the ends. The two pairs of limbs are nearly equal in size, and in structure very much resemble those of the *proteus*. They have each four long, slender digits, which obviously supported a longish, narrow-pointed paddle, adapted for swimming. Externally, the body was protected by a covering of oblong quadrangular scales, which have been preserved in some specimens.

Four species have been described.

The history of the A. is shortly this: Its remains, found in the Bavarian coal-measures, had been described as those of a fish under the name of *pygopterus lucius* (Agassiz). In 1844, H. von Meyer first described it under the name of *apateon pedestris*. This specimen was found in the coal-measures of Münster-Appel, in Rhenish Bavaria, and was supposed by Meyer to be related to the salamanders, and yet not without considerable doubt; for he says, "its head might be that of a fish, as well as that of a lizard, or of a batrachian." In 1847, Goldfuss figured and described three distinct species discovered in large concretionary nodules of clay-ironstone, from the coal-field of Saarbrück, giving to them the generic name of A. He considered them to be a transition state between the fish-like batrachia and the lizards and crocodiles. Prof. Owen has subsequently described this fossil; he makes it a remarkable connecting link between the reptile and the fish, and on these grounds: It is related to the salamandroid-ganoid fishes by the conformity of pattern in the plates of the external cranial skeleton, and by the persistence of the *chorda dorsalis*, as in the sturgeon, while it is allied to the reptiles by the persistence of the *chorda dorsalis*, and the branchial arches, and by the absence of the occipital condyle, or condyles, as in *lepidosiren*, and by the presence of labyrinthic teeth, as in *labyrinthodon*, which, however, also ally it to the ganoid *lepidosteus*. There is thus in the A. a blending together of the characteristics of reptile and fish in one animal. It occupies a position between, and equally related to, the salamandroid-ganoid fishes on the one hand, and the labyrinthodont reptiles on the other, while the latter conduct us through the *lepidosiren* to the perennibranchiate batrachia.

ARCHELA'US, one of the Heraclidæ, who, when driven by his brothers from his native land, fled to Macedon, where he became the founder of a powerful family, of which Alexander the Great was said to be a descendant.—**ARCHELAUS**, natural son of the Macedonian king, Perdiccas II., came to the throne (after he had murdered the rightful heir) in 413 B.C. His reign was far better than its commencement, as he introduced several salutary measures, and was a generous patron of art and literature. Euripides and Zeuxis frequented his court; and the palace of the monarch was splendidly adorned by the paintings of the latter. It is said that Socrates refused an invitation to proceed thither, having no great respect for the character of A., which was stained by odious vices. He is believed to have been murdered by Craterus, one of his favorites; but the story of his death is told differently.—A., a general under Mithridates the Great, was sent into Greece

with a large fleet and an army of 120,000 men to oppose the Romans in 87 B.C. Sulla was sent against him, and besieged him in Piræus, whence A. moved to Bœotia, and here collected all his forces. A battle took place at Chæroneia, when victory declared for the Romans. A. now retreated to Chalcis, where he waited until Mithridates had dispatched another army of 80,000 men into Greece. The second fight took place at Orchomenos, in Bœotia, and, after two days' contest, the whole host led by A. was totally routed by Sulla. A., after hiding for three days in a morass, escaped to Chalcis. After a treaty of peace had been effected between Sulla and Mithridates, A. fell under the displeasure of his monarch, being unjustly suspected of treason, and, fearing for his life, as also perhaps disgusted at the return he had received for his many services, he went over to the Romans at the outbreak of the second war, in 81 B.C. After this time he appears no more in history.—A., son of the former, married Berenice, daughter of King Ptolemæus Auletes (56 B.C.), and ruled over Egypt for the short space of six months during the banishment of Ptolemæus. The usurper lost his life in a battle against Aulus Gabinius, proconsul of Syria. His grandson, also named A., obtained from Marcus Antonius the province of Cappadocia, and retained it during the reign of Augustus. Tiberius accused him of political innovations, and condemned him to death; but, as he was old and fatuous, his life was spared. He died soon after his trial, at Rome, in 17 A.D.—A., son of Herod, the tyrant at Judea, succeeded his father in 3 B.C., and maintained his position against an insurrection raised by the Pharisees. His heirship to the throne being disputed by his brother Antipas, A. went to Rome, where his authority was confirmed by Augustus, who made him Ethnarch of Judea, Samaria, and Idumæa. After a reign of nine years, he was deposed by Augustus, on account of his cruel tyranny, and banished to Vienna, in Gaul, where he died. His territories were added to the Roman province of Syria.

ARCHELAÛS, surnamed **PHYSICUS**, a Greek philosopher, pupil of Anaxagoras, about 450 B.C. Nothing of his writing remains, but his leading ideas were like those of his tutor. He admitted a primitive matter, consisting of infinite particles similar in nature to the bodies formed from them. He also admitted a ruling mind. He thought matter was mingled with mind, and identified the primitive matter with air; thus his first principle was air endowed with mind. Out of this air, by processes of thickening and thinning, arose cold and heat, or water and fire, the first passive, the last active. From the action of fire and water were formed the atmosphere, and the mud out of which the heavenly bodies were developed. Living organized beings, at first of low type, sprang from the mud, and gradually the races of animals were formed. Man he held to be superior to other beings by reason of his artistic and moral powers.

ARCHELAÛS, a sculptor, celebrated for his bas-relief representing the apotheosis of Homer, which is supposed to have been made in the 1st c. of the Christian era. It was purchased in 1819 for the British Museum.

ARCHENHOLZ, **JOHANN WILHELM**, Baron von, a German author, b. Sept. 3, 1743, d. Feb. 28, 1812. After service in the army, he gained his discharge at the close of the seven years' war, and passed several years in travel, visiting almost all the principal cities of Europe, and supporting himself by authorship, and, as it was generally reported, also by gambling. He wrote a *History of the Seven Years' War* (2 vols., Berlin, 1793), which, when compared with the generally dry style of his German contemporaries, deserves praise on account of its narrative interest. He also wrote *England and Italy* (2d edition, Leip., 1787), *Annals of British History* (1789-98), and biographies of queen Elizabeth of England and Gustavus Vasa of Sweden.

ARCHER, a co. in n. Texas, of about 900 sq.m., thinly settled, but favorable for cattle-raising and the growth of cereals. There are also valuable minerals, bismuth among them. Pop. 1890, 2101, co. seat, Archer.

ARCHER, **JOHN**, 1741-1810; b. Md. The first man in the United States honored with the degree of doctor of medicine. He was an officer in the army of the revolution; member of the Maryland general assembly, and representative in congress from that state for three terms, 1801-7.

ARCHER FISH, a name given to certain small East Indian fishes of the acanthopterygious family of *squamipennes* or *chaetodontidae*, which have the faculty of projecting drops of water with sure aim at insects, and thereby causing them to fall into the water, where they are instantly seized as prey. *Toxotes jaculator*, one of these species, is a fish about 6 or 7 in. in length, a native of Java and other parts of the Indian archipelago, and is that to which the name A. F. has been more strictly appropriated. It can project a drop of water to the height of 4 or 5 feet. It is the only known recent species of its genus, but there is a fossil one. *Chelmon rostratus*, also a Javanese fish, possesses the same power, and the Chinese in Java keep it in jars for their amusement, causing it to practice its art by placing insects within its range.

ARCHERS and **ARCHERY**. Archers are soldiers whose weapons are the bow and arrow. Among the ancients specially eminent in this mode of warfare, we may particularize the Thracians, Cretans, Parthians, and Numidians; among the moderns, the Arabians, Germans, and Saracens. The emperor Frederick II. employed Saracenic archers with great effect in his Lombard campaign; and to them is ascribed the victory at Cor-

tenuova in 1237. The archers belonged to the light troops, and their province was to open the battle. The emperor Leo especially lauded the dexterity of the Arabian archers. In later ages, the bow came to be employed in England, where the archers wore light armor, a short sword, and a quiver with twenty or more arrows. At first, these archers fought in small groups; in later years, in large masses. At the battle of Cressy, they formed in divisions of 4000 men, 200 in line and 400 deep. The archers decided the fate of the day in several battles—such as Cressy and Poitiers (1356), Agincourt (1415), Crévaux (1423), Verneuil (1424), and Rooversay (1429). The French archers never equaled the English, in spite of the pains Charles VI. and Charles VII. took with them. The latter organized in 1448 the *Franc-archers*, to which corps every parish had to contribute one man; but this measure was attended with so little success that the king was induced to take Scottish archers into his pay, to make any head against the English. The French archers wore a coat of buffalo-hide lined with strong linen, and were accompanied by shield-bearers. In this manner 2000 bowmen with their shield-bearers fought under the count de Foix at the siege of Bayonne in 1451. The archers universally belonged to the élite of the troops, and received higher pay than the rest. At one period, the arbalest or cross-bow was more in favor than the long-bow. See ARBALEST. Long after the discovery of gunpowder, we find the bow and arrow still used; as, for example, at the siege of Capua in 1500; and the siege of Peineburg in 1502. Nay, even in 1572, queen Elizabeth promised to place at the disposal of Charles IX. 6000 men, of whom the half were archers. The English archers are the subject of frequent mention by our old writers. Chaucer, in his *Canterbury Tales*, speaks of the archer

“Cladde in cote and hode of grene,
A sheafe of peacock arwes brighte and kene,
Under his belt he bare ful thurffille,
Wel coude he dresse his takel yewmanlie,
His arwes drouped not with fetthers lowe,
And in his hand he bare a mighty bowe.”

In a treatise on martial discipline, by Ralph Smithe, written in the time of Queen Elizabeth, we have a picture of the English archer two centuries after Chaucer's time: “Captains and officers should be skilful of that most noble weapon the long-bow; and to see that their soldiers, according to their draught and strength, have good bowes, well nocked, well strynged, everie stryng whippe in their nocke, and in the middes rubbed with wax braser, and shutting-glove, some spare strynges trymed as aforesaid; every man one shefe of arrows, with a case of leather defensible against the rayne, and in the same four-and-twenty arrowes, whereof eight of them should be lighter than the residue, to gall or astoyne the enemye with the hailshot of light arrowes before they shall come within the danger of their harquebus shot. Let every man have a brigandine or a little coat of plate, a skull or hufkyn, a maule of leade of five foote in lengthe, and a pike, and the same hanging by his girdle with a hook and a dagger.”

Among the Asiatic Turks, the Persians, the Tartars, and other nations of the east, as well as among the American Indians, the bow and arrow are still in more or less common use as weapons of war, but in Europe they are almost entirely abandoned for military purposes.

Although archers are still included among the fighting-men of barbarous and semi-barbarous nations; in England, archery is now nothing more than a pastime, encouraged by archery clubs or societies. In this sense, however, archery is experiencing a revival, being healthful as an out-door exercise, even if no further useful. During the reign of Charles II., archery was much patronized by the court, Tothill fields being the chief scene of exercise. After his reign, archery fell into desuetude for about a century. In 1776, a Mr. Aston revived archery in the neighborhood of London; and very shortly there were several toxophilite or archery societies formed. The system survived till 1793, when another period of inactivity supervened, lasting till 1844. In this last-named year, archery was revived in Yorkshire, and has since gone on extending every year. A recommendation to the sport is that ladies can take part in it—one of the few open-air pastimes of which this can be said. In the modern exercise of archery, there are several varieties of contests between the antagonistic parties; but the usual variety is target-shooting. In archery-matches, a number of prizes are generally awarded, the principal being for the greatest number of arrows shot into any part of the target, and for the nearest approach to the exact center. The target has a gold spot in the center, a red ring around this, then a blue ring, then a black, and outside of all a white ring bordered with green. The merit of the shooting consists in a near approach to the exact center or “gold.” Two targets are generally used in a match, on opposite sides of the field, each by one party. The apparatus mostly used at these archery meetings is: 1, the bow, varying in weight according to the strength of the person who is to use it; 2, the arrow; 3, the quiver, a tin case for holding arrows not immediately in use; 4, the pouch; 5, the belt for holding the arrows actually in use. The tassel of the belt serves to clean the arrows when dusty. 6, the brace, buckled round the left arm, to protect it from being hurt by the string when shooting; 7, the shooting-glove, formed to protect the three fingers used in drawing the string. Besides these articles and the target, archers are sometimes provided with a large case called an “ascham,” fitted

up with the necessary drawers and compartments for the reception of the bow, arrows, string, and other necessary accouterments.

In archery competition, the total number and value of each person's hits are registered on a scoring-card. The shots are usually punctured on a card with a pin, as being preferable to pencil or ink marks; and the mode of ascertaining the value of the hits, which is increased in proportion as they reach the center, will be seen by the following example:

FORM OF THE SCORING-CARD.

Names.	Gold.	Red.	Blue.	Black.	White.	Total.	Value.
A.....	35	119
B.....	26	90

It appears by the card that A has 2 in the gold, 4 in the red, 6 in the blue, 10 in the black, and 13 in the white, making a total of 35. The real value of these is ascertained by multiplying the hits in the gold by 9; in the red, by 7; in the blue, by 5; in the black, by 3; and by leaving without alteration the number in the white or outer. By this process it will appear that A's numbers, according to the value of each circle, amount to 119, and B's to 90—hence A is the winner by 29. But A's total might have been less than B's, and still he might have been the winner, providing the shots had lain more towards the gold than B's.

ARCHES, COURT OF. The name is derived from the ancient place of sitting, which was in the church of St. Mary of the Arches, now usually called Bow church, London. The old church, which was destroyed in the great fire of 1666, had a fine arched crypt, whence came the name. The C. of A. is the court of appeal of the archbishop of Canterbury, as metropolitan of the province, and the judge is styled the dean of the arches. Appeals from decisions of the C. of A. are heard before the judicial committee of the privy council. The C. of A. is empowered to hear such suits as are sent up to it by letter of request from the consistorial courts of the bishop of the province of Canterbury after they have issued commissions of inquiry and the commissioners have made their report. The official principal of the C. of A. is the only ecclesiastical judge who is empowered to pass a sentence of deprivation against a clerk in holy orders.

ARCHETYPE (Gk., *arche*, beginning, *typos*, type), the original pattern or model of a work, the model from which a thing is made. In the philosophical system of Plato, the word denoted the universe as it existed in the divine mind before creation. In palaeography, archetype means an older manuscript, to which existing manuscripts can be traced. See TEXTUAL CRITICISM.

ARCHIAS, AULUS LICINIUS, a Greek poet of the 2d c. B.C., defended by Cicero in one of his most noted orations. He passed his life almost entirely in Rome and among Romans, serving under L. Lucullus, Sulla, and other eminent commanders. Cicero and Quintilian praise his gift of extemporization, the richness of his language, and his wealth of thought.

ARCHIATER, or **ARCHIATOR**, "principal," or "chief physician," a complimentary title given by some Roman rulers to their favorite medical attendants, who were usually Greeks. The use of the title and the office spread to all large towns, and a certain number of doctors were selected as archiatri, with salaries and perquisites, but required to minister to the poor without charge. They also served in the same capacity as modern health officers. A similar medical order is still found in some of the Scandinavian countries.

ARCHIBALD, Sir ADAMS GEORGE, b. 1814; an English colonial statesman. He was a native of Nova Scotia, and was twice chosen to the colonial legislature, in 1851 and 1855. In 1856 he was solicitor-general, and one of the liberal leaders, and was again sent to the legislature. He was president of the council in the cabinet formed by Sir John Young, and secretary of state for the province; in 1871 received the office of lieutenant-governor of Manitoba, but resigned the next year. He died in 1892.

ARCHIDAMUS II., King of Sparta, 17th of the Eurypontids, son of Zeuxidamus. He took the sceptre after the banishment of his grandfather Lectychides, 469 B.C. In the fourth or fifth year of his reign Greece was shaken by a terrible earthquake, and Sparta was left a heap of ruins. He seems to have been a wise and temperate ruler, moving with deliberation, and more merciful than might have been expected in those days. His only famous child was Agesilaus.

ARCHIDAMUS III., grandson of A. II., King of Sparta, 20th of the Eurypontids. He succeeded his father 361 B.C. In six years afterwards he defeated the Argives and

Spartans, and the next year defended Sparta against Epaminondas. In the sacred war he at first assisted the Phocians, but when Philip came into the field he abandoned them. In 338 he went to Italy as an ally of the Tarentines, and was slain in battle on the same day that Philip won the important victory of Chæronea.

ARCHIDAMUS IV., grandson of A. III., King of Sparta, 23d of the Eurypontids. In 296 B.C. he was defeated by Demetrius Poliorcetes.

ARCHIDAMUS V., King of Sparta, 27th of the Eurypontids, brother of Agis IV. On his brother's murder, 240 B.C., A. fled, but subsequently obtained the throne through the assistance of Aratus. But he was killed by those who had slain his brother, and so ended the last of the Eurypontids, his sons being passed over and the crown given to Lycurgus, a stranger.

ARCHIL, or **ORCHIL**, is a coloring substance obtained from various species of lichens. The A. is not originally present in the lichens, but is developed during a process of putrefaction and fermentation. The lichens, collected from rocks near the sea, are cleaned, ground into a powder with water, placed in tanks, and ammoniacal liquids—such as purified gas liquor or stale urine—added; when, by the combined influence of the ammonia, air, water, and the constituents of the lichens, a violet-colored matter is generated, which appears for a time to dissolve in the water, but finally falls to the bottom of the vat in the condition of a moist powder or paste. The latter is then mixed with some substance like chalk or stucco, to give it consistence. The lichens which yield the best A. in largest quantity, are *roccella tinctoria* and *fuciformis*. The former is called the *Archil* plant, and is obtained in large amount from the Canaries and Cape de Verd island, and the Levant. Another lichen, *lecanora tartarea*, collected from rocks in Sweden, is largely imported into Britain. It is sometimes called cudbear (q.v.), or cudbear lichen, and sometimes white Swedish moss. A. is soluble in water and in alcohol, to either of which it imparts a violet color, with a good deal of a crimson hue. It is much employed in the dyeing of silks, where a beautiful lilac color is required; but though a brilliant rich hue is imparted to the silken fabric, the color is not a permanent one, being easily acted upon by the rays of the sun. Hence the A. is seldom used by itself, and the cloth is first dyed lilac by another coloring matter, and is then passed through an A. dye, which imparts a brilliant lilac hue to the cloth. A. is seldom employed to dye cotton cloth, but it is often used, along with indigo, in the dyeing of woollen cloth; and besides enabling the indigo color to go much further, it imparts its peculiar rich tint to the blue or black cloth or yarn immersed in it; the color, however, so obtained is not so permanent as where the A. is left out. Cudbear (q.v.) and litmus (q.v.) are analogous to A., and are obtained from the same lichens.

The lichen distinguished by the name of the A. plant or lichen *roccella tinctoria*, grows very sparingly on the southern coasts of England, but abundantly on the shores of the Mediterranean and of the neighboring parts of the Atlantic, where it often covers rocks near the sea, so as to form what has been likened to a sort of turf upon them. The Spanish name is *orciglia*, from which the French *orseille*, the English A. or orchil, and even the botanical name *roccella*, are derived. Its substance is between cartilaginous and leathery, roundish, pretty erect, branching in a dichotomous manner, of a grayish brown color, with powdery warts (*soredia*): the *apothecia* (see LICHENS) orbicular, flat, horny, almost black, with a scarcely prominent border. That from the Canary isles is generally regarded as the best. It seldom exceeds the thickness of a pin, and about an inch and a half in length. A less branched and more slender, prostrate, or pendulous variety (*roccella hypomecha* of Bory de St. Vincent) is common at the cape of Good Hope and in the island of Mauritius, and appears in commerce along with the other, but is of very inferior quality. A variety remarkable for its large size, or perhaps a distinct species (*R. flaccida*), is brought from Lima and other parts of the w. coast of South America; it is sometimes as thick as a goose-quill, and 6 or 8 in. long, and is of excellent quality. All these, and *roccella fuciformis*, very generally receive in commerce, and from A.-makers, the name of orchella weed, the different kinds being distinguished according to the countries from which they are imported. They are also popularly called dyer's moss.—*R. fuciformis* now yields perhaps more of the A. or orchella weed of commerce than *R. tinctoria*. It differs from *R. tinctoria* chiefly in being not rounded, but flat, and in having the *apothecia* very distinctly bordered. It grows in similar situations, and is also a native of Britain, but abundant only in warmer climates, as on the coasts of Africa, Madagascar, etc. That from Angola is reckoned of the very best quality.

Among the lichens from which A. is manufactured is the *pareille d'Auvergne* or *orseille de terre* (ground A.) of the French, *variolaria oreina* or *corallina*, which is gathered for this purpose in mountainous districts of the s. of France and other parts of the s. of Europe, and is also an article of export (with other similar lichens) from Sweden to Holland. But the greater facility with which A. of the finest quality can be procured from the species of *roccella*, and the increasing abundance of the supply from different quarters, particularly from Angola, tend to diminish the demand for other lichens.

ARCHILOCHUS of PAROS, in Lydia, flourished about 714–676 B.C., and is regarded as the first of the Greek lyric poets, although the origin of the elegy is claimed by Callinus, a writer whose age seems to have slightly preceded that of A. Glimpses of his life, especially of the calamities which befell him, were frequently given in his writings.

His father's name was Telesicles, his mother was a slave called *Enipo*. At an early age, becoming entangled in political contests, he abandoned his native town, and led a colony of the citizens to Thasos. While here, as he informs us in some extant verses, he lost his shield in a battle against the Thracians, yet not through cowardice. Subsequently he was banished from Sparta, to which he had gone, some say because he had vindicated his conduct in running away from the fight, others, because of the licentiousness of his verses. He is said to have gained the laurel-wreath at the Olympic games by an ode in honor of Hercules, but this is doubtful. Having returned to Paros, he took part in the war which broke out betwixt it and Naxos, in the course of which he lost his life, either in battle or by assassination. The Delphian oracle pronounced a curse upon his slayer. Variety, novelty, and satirical bitterness characterized his lyric poems: so much so, that "Archilochian bitterness," and "Parian verse," became by-words in ancient times. He scourged his enemies in the most merciless fashion, and always displayed the most malicious skill in selecting for his sarcasm the points on which they were most sensitive. It is said that Lycambes, who had promised his daughter Neobule in marriage to A., having failed to fulfill the promise, was so severely satirized by the poet, that, to escape ridicule, both father and daughter hanged themselves. Among the ancients, A. was ranked with Homer. They dedicated the statues of both on the same day, and placed the head of A. beside that of Homer on the same bust. It is therefore supposed, and with high probability, that there must have been far more in A. than mere vehemence of satire. Even Plato, who was not likely to err on the side of admiration in such a case, calls him "the very wise;" and Georgias, the rhetorician, is reported to have said, when Plato sent forth his dialogues against the sophists, "Athens has given birth to a new A." There must have been strong sense, and a keen perception of truth in the man, to have won so universal and permanent a reputation. Still the line of Horace—who was a vigorous imitator of him in many respects—proves that "rage" was considered "the special faculty" of A.

"Archilochum proprio rabies armavit iambo."

Ars Poetica, line 79.

"Rage hath armed Archilochus with his own iambus."

The word *iambus* was in use before the time of A., and was employed to denote a species of rude raillery, such as flashed out spontaneously under the inspiring excitement of the Bacchic and other festivals. A. was, however, the first to reduce these irregular and capricious effusions to fixed rules. See **IAMBIC**. The semi-pentameter, of which he made abundant use, was called after him *Archilochian verse*.

The fragments extant of his poetry have been edited by Bergk in his *Poeta Lyrici Græcorum* (Leipsic, 1843).

ARCHIMANDRITE (Gr. *archi*-, chief, and *mandra*, a fold or a convent), the title of the highest order of superiors of convents in the Greek church (see **ABBOT**). The Russian bishops are chosen from among the archimandrites.

ARCHIMÉDES, the most celebrated of ancient mathematicians, was b. at Syracuse about 287 B.C. He is said to have been a kinsman of king Hiero, though he does not seem to have held any public office, but devoted himself entirely to science. In regard to mathematics, we cannot estimate fully the merits of A. without a more exact knowledge of the state of the science as he found it; we know, however, that he enriched it with discoveries of the highest importance, on which modern mathematicians have founded their methods of measuring curved surfaces and solids. Euclid only considers a few curved figures in relation to one another, but without comparing them with rectilinear surfaces and solids. The theorems necessary to this transition are laid down by A. in his treatises "on the Sphere and Cylinder," "on Spheroids and Conoids," and "on the Measurement of the Circle." His demonstration that the area of a segment of a parabola is two thirds of the inclosing parallelogram, is the first real example of the quadrature (q.v.) of a curvilinear space. In his treatise on spirals, he rises to yet higher investigations, which, however, are not very easily understood even by masters of the subject.

A. is the only one of the ancients that contributed anything satisfactory on the theory of mechanics and on hydrostatics. He first established the truth, that a body plunged in a fluid loses as much of its weight as is equal to the weight of an equal volume of the fluid. (See the following article.) It was by this law that he determined how much alloy the goldsmith, whom Hiero had commissioned to make a crown of pure gold, had fraudulently mixed with the metal. The solution of the problem suggested itself to him as he was entering the bath, and he is reported to have been so overjoyed as to hasten home without waiting to dress, exclaiming: "I have found it! I have found it!" (*Eureka! Eureka!*) Practical mechanism seems to have been an equally new science in the days of A.; for his boast, that if he had a fulcrum or stand-point, he could move the world, betrays the enthusiasm with which the extraordinary effects of his newly invented machines inspired him. Among the numerous inventions ascribed to A., is that of the endless screw, and the *cochlea* or water-screw (see **ARCHIMEDES' SCREW**), in which the water is made in a manner to ascend by its own gravity. During the siege of Syracuse by the Romans, he exerted all his ingenuity in the defence of the city. Poly-

bius, Livy, and Plutarch speak with astonishment of the machines with which he opposed the attacks of the enemy. But while giving detailed accounts of his other contrivances, they say nothing of his having set fire to the ships by means of mirrors, a story which is not very probable in itself, and rests on later narratives. When the Romans took the city by surprise (212 B.C.), A., according to the tradition, was sitting in the public square lost in thought, with all sorts of geometrical figures before him drawn in the sand. As a Roman soldier rushed upon him, he called out to him not to spoil the circle! But the rude warrior cut him down. According to his own direction, a cylinder inclosing a sphere was engraved upon his tombstone, in commemoration of his discovery of the relation between these solids—a discovery on which he set particular value. When Cicero was in Sicily as questor, he discovered the tomb hid among briars. His collected extant works were edited by Torelli (Oxf. 1792). There is a French translation with notes by F. Peyrard (Paris, 1808, 2 vols.), and one in German by Nizze (Strals. 1824). The *Arenarius* was translated into English by G. Anderson (Lond. 1784). The object of the treatise is to prove that it is possible to assign a number greater than that of the grains of sand that would fill the sphere of the fixed stars, the diameter of which A. assumes at a certain number of stadia. The difficulty lay in expressing such a vast number by means of the clumsy notation of Greek arithmetic, and the device by which the difficulty is eluded is considered as affording a striking instance of A.'s genius. See Heiberg's edition of A.'s works, with Latin translation (Leipsic, 1881).

ARCHIMEDES, the **PRINCIPLE OF**, is one of the most important in the science of Hydrostatics, and is so called because the discovery of it is generally ascribed to the Syracusan philosopher. It may be thus stated: A body when immersed in a fluid loses exactly as much of its weight as is equal to the weight of the fluid it displaces; or: A fluid sustains as much of the weight of a body immersed in it as is equal to the weight of the fluid displaced by it. It is proved experimentally in the following way. A delicate balance is so arranged that two brass cylinders, A and B, may be suspended from one of the scale-pans, the one under the other. The lower cylinder, B, is solid, or closed all round, and fits accurately into the upper cylinder, A, which is hollow. When the two cylinders are placed under the one scale, pan-weights are placed upon the other until perfect equilibrium is obtained. The cylinder B is now immersed in water, and in consequence of the buoyant tendency of the water exerted upon it, the equilibrium is destroyed; but it may be completely restored by filling the hollow cylinder, A, with water. The amount of weight which B has lost by being placed in the water, is thus found to be exactly the same as the weight of a quantity of water equal to its own bulk, or which is the same thing, to the quantity of water displaced by it. When bodies lighter than water are wholly immersed in it, they displace an amount of water of greater weight than their own, so that if left free to adjust themselves, they swim on the surface, only as much of their bulk being submerged as will displace a quantity of water weighing the same as themselves. Accordingly, while bodies heavier than water displace, when put into it, their own bulk, bodies lighter than water displace, when allowed to float on the surface, their own weight of the fluid. Bodies of the same weight as water, according to the principle of Archimedes, have no tendency to rise or sink in it, for the water displaced by them weighs precisely the same as they do. The pretty scientific toy called the Cartesian diver is intended to illustrate this. Although the principle of Archimedes is generally established with reference to water, its application extends equally to bodies immersed in air or any other fluid.

ARCHIMEDES' SCREW (called also the *spiral pump*), a machine for raising water, said to have been invented by Archimedes, during his stay in Egypt, for draining and irrigating the land. Its simplest form consists of a flexible tube bent spirally round a solid cylinder, the ends of which are furnished with pivots, so as to admit of the whole turning round its axis. The machine is placed in an inclined position, so that the lower mouth of the tube may dip below the surface of the water to be raised. The lowest bend of the tube will be filled with water, and if now the handle be made to turn in the direction of the hands of a watch, the mouth of the spiral tube will be raised above the surface; and the water inclosed in the tube, having no means of escape, will flow within it until, after one revolution, it will occupy the second bend. The first bend has meanwhile received a second charge, which, after a second revolution, flows up into the second bend, and takes the place of the first charge, which has now moved up to the third bend. When, therefore, as many revolutions of the cylinder have been made as there are turns in the spiral tube, each of the lower bends will be filled with water; and in the course of another revolution, there being no higher bend for the water of the first charge to occupy, it will flow out of the tube by its upper mouth. At each succeeding revolution, the lowest bend will be charged, and the highest discharged. It will be seen that there may be room to dispose a second tube side by side with the first, round the cylinder, in which case the screw would be called double-threaded. In the ordinary construction of these machines, the cylinder itself is hollowed out into a double or triple threaded screw, and inclosed in a water-tight case, which turns round with it, the space between the threads supplying the place of tubes. It is sometimes found convenient to fix the exterior envelope, and to make the screw work within it, the outer edge of the latter being as close as possible to the former without actual contact. This modification

of the A. S. receives the name of water-screw, and frequently of Dutch screw, from its being extensively used in Holland for draining low grounds.

ARCHIPELAGO, a term (of doubtful etymology) applied originally to that gulf of the Mediterranean which separates Greece from Asia; but now extended to any sea, like it, thickly interspersed with islands, or rather to the group of islands themselves. The islands in the Greek archipelago or *Ægean* sea consist of two groups, called Cyclades and Sporades; the first from their being massed after the manner of a circle, the second from their being scattered in something of a line. The former lie to the east of southern Greece, while the latter skirt the w. of Asia Minor.

Of the Cyclades the principal islands are: *Lyra*, *Kythnos*, *Thera*, *Tenos*, *Andros*, *Naxos*, *Melos*, and many more of inferior size. They all belong to *Greece*, and will more conveniently be considered in connection with it. The chief islands of the Sporades are: *Scarpanto*, *Rhodes*, *Cos*, *Patmos*, *Nicaria*, *Samos*, *Scio*, *Metelin*, *Lemnos*, *Imbros*, *Samothraki*, *Thasos*, and many more of inferior size. These all belong to *Turkey*, and constitute a separate vilayet of the empire. Of both groups, the more considerable islands will be noticed, under the alphabetical arrangement, in their respective places.

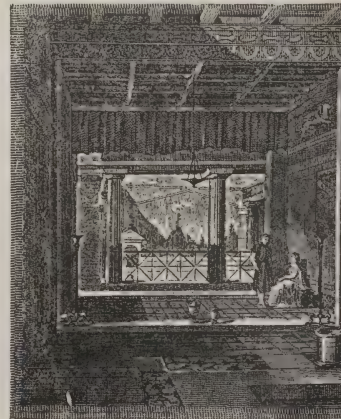
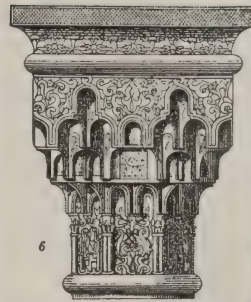
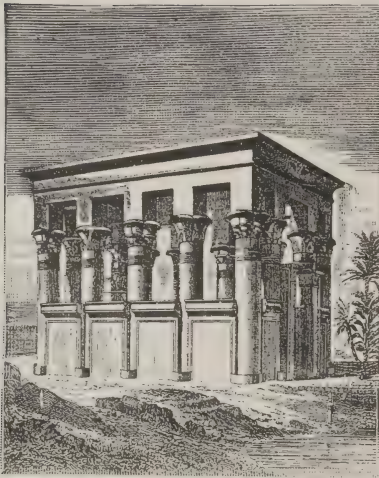
The other archipelagoes, loosely so called, will receive separate notice each in its proper place.

A remarkable circumstance may be mentioned in connection with archipelagoes. The islands of the globe rarely stand alone. With very few exceptions, they may all be classified into clusters. In most clusters, again, there is generally more or less of similitude between the different members of each—similitude sometimes of one kind, and sometimes of another. Perhaps the similitude that is most obvious even on the face of an ordinary map, is that, really like the links of a chain, the members of a cluster have their lengths, as distinguished from their breadths, in one and the same direction. In the West Indies, for instance, look at the *Bahamas*, and look also at the *Antilles*, Greater and Lesser. In the East Indies, again, the same thing is seen in carrying the eye from the n. end of the *Philippines* to the n. end of *Sumatra*, or even of the *Andamans*. Lastly, on the opposite coasts of the upper Pacific, observe the American side upwards from the s. end of *Vancouver's Island* to *Mt. St. Elias*, and the Asiatic side downwards from the upper extremity of *Kamtschatka*—which is all but an island—through the *Kuriles*, to the lower extremity of *Japan*.

ARCHITECT'URAL PAINTING has for its subjects the exteriors or interiors of remarkable buildings: churches, castles, streets in cities, etc. It is mentioned by *Vitruvius*, but is comparatively a modern art. *Benozzo Gozzoli*, *Ghirlandajo*, and the Venetian school, cultivated this department of art in the middle ages; and *Pinturicchio*, by order of *Pope Innocent VIII.*, painted a series of views of cities in the style of the Flemish school, which, under the brothers *Van Eyck*, had distinguished itself by careful treatment of architectural backgrounds, etc. For a long time A. P. was regarded only as accessory to other styles of art; but, at the close of the 16th c., *P. Neefs* in his views of the interiors of Gothic churches, gave to this branch of the fine arts an independent form; and *Steenwyck* the younger, in the following century, extended its application in his views of the interiors of prisons, of which his picture of "Peter Liberated from Prison" is an example. The art was still further extended and cultivated by *Van der Heijden*, *Blick*, *Van Deelen*, *E. de Ville*, *Johann Ghering*, and others who painted views of church interiors in the Italian style, palaces, and chambers. The interior view of the church of *Amsterdam*, painted by *Ruisdael*, deserves especial notice. In the 18th c., the Venetian *Canale* and his nephew *Bellotto* (generally known by the name of *Canaletto*), painted many views of cities, but especially of the canals and buildings of *Venice*. Collections of their numerous works are found at *Dresden*, *Woburn abbey*, etc.

In recent times, A. P. has been very successfully cultivated in *Germany*, *France*, *England*, *Holland*, and *Belgium*. *Schinkel* is celebrated for his fine union of classical taste with richness of decorative invention. His two most striking works are *St. Peter's*, and the *Duomo* at *Milan*; *Paul Gropius* has shown great talent in his cathedral at *Rheims*, built in honor of *Joan of Arc*. His dioramas are well known; and *Domenico Quaglio*, who d. in 1837, throughout his innumerable compositions, has exhibited an exquisite appreciation of perspective, and of the poetical arrangement of details. Among modern A. painters may be mentioned—in *England*, *Prout* (views of *Italy*, *Germany*, etc.), *Roberts* (whose genius has sought for its materials in *Spain* and the east, and who paints the architecture of foreign lands with rare truthfulness and lively vigor), *Mackenzie*, *Goodall*, *Williams*, and the water-color painters *Haghe*, *Chase*, *Howse*, and others; in *France*—*Granet* (d. 1849), the most celebrated art painter of the new French school; and the water-color painters *Ouvrié*, *Garneri*, *Rochebrune*, and *Villeret*; in *Italy*—*Migliara* and *Nehrlich* (a German, who has been styled "the modern Canaletto"); in *Germany*—*Von Bayer*, *Hasenpflug*, of *Halberstadt* (who painted beautifully old cloister-alleys under winter-effects), *Ainmuller*, *Vermeersch*, *Pulian* of *Düsseldorf* (who displays great skill in the representation of old streets and time-worn churches), *Conrad*, *Gärtner*, *Greb*, *Helfft*, *Dietrich*, etc.; in *Holland* and *Belgium*—*Waldorp*, *Carsen*, *Boosborn*, *Von Haanen*, *Ten Kate*, *Springer*, and *Bossuet*.

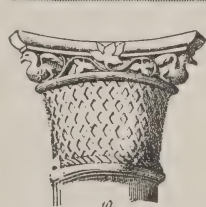
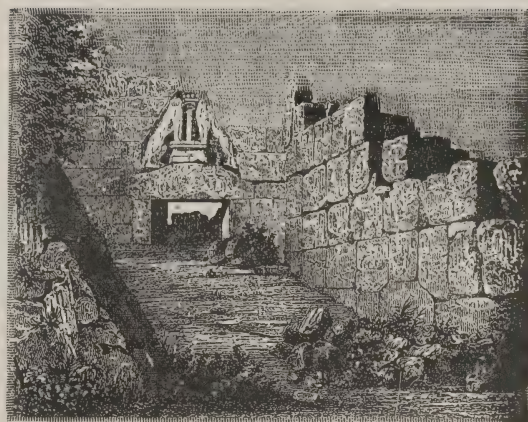
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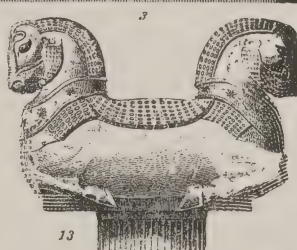
ARCHITECTURE.—1. Temple of Edfu, Egypt. 2. Teocalli, Central America. 3. Lion gate from the Alhambra. 7. Base of pillar from Cervetri. 8. Egyptian capital. 9. Greek capital. 12. Renaissance capital from Trent. 13. Capital from Persepolis. 14. Old houses, Nu



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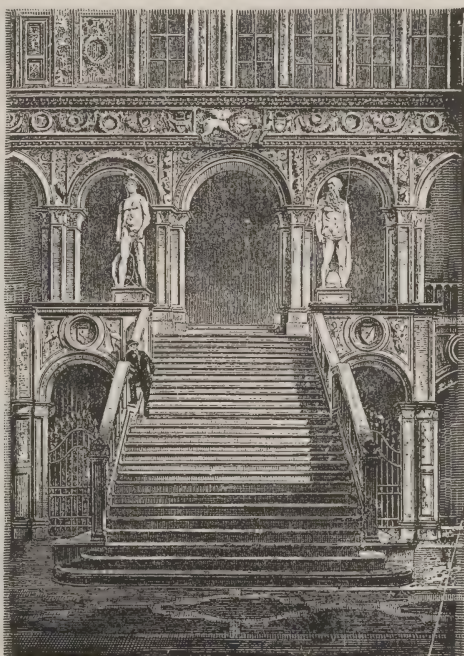
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ycenæ. 4. Restoration of Greek (Doric) temple. 5. House at Pompeii. 6. Capital
onic) capital. 10. Capital from Ravenna. 11. Romanesque base (Parenzo cathedral).
iberg. 15, 16. Moorish stucco-work. 17. Renaissance stair-case, Venice.

ARCHITECTURE, in its widest sense the art of building any structure with reference to its uses and requirements, is more usually restricted to the art of erecting and arranging edifices, as distinguished from Military and Naval Architecture. It includes various more or less independent divisions,—Ecclesiastical, Public, Private, etc. In buildings designed primarily for utility, the attainment of that end, by mechanical skill, practice, and happy combination, is of chief importance. But when the builder adds to his mechanical handiwork the adornments of artistic taste and invention, Architecture reaches its highest development and takes its place among the fine arts.

The architect is concerned not only with the shell of the building, its foundation and superstructure, but also with its internal arrangement and decoration—the staircases, heating and lighting apparatus, woodwork, painting, etc. For dwellings, buildings of stone or brick are generally considered best because most lasting and least inflammable, facilitate the maintenance of equable temperatures (see *SANITARY SCIENCE*), and are best fitted for interior and exterior ornamentation. Walls built of rough stone demand greater thickness than where cut stone or brick is used, as do also the walls of long buildings without division walls. In regard to the time of building, account must be taken of the length of time necessary for the completion of the structure, the most favorable season, and the most advantageous order of the various operations. It is of advantage to extend the time of building over a considerable period, because after the completion of certain portions pauses are very useful, especially for the foundation before the walls are laid, and for the walls before they are plastered. The winter months in cold climates are least fitted for building operations; walls particularly, in which common mortar is used, should not be built before or during a frost. The rougher carpenter work may be done without disadvantage during the winter, but finer woodwork, laying floors, fitting doors and windows, should be postponed to a dry and warm season. The laws regulating the erection of buildings vary widely in different countries, the strictest oversight being exercised in Germany.

HISTORY OF ARCHITECTURE.—The origin of A., like those of the other arts, is wrapped in obscurity. Caves and huts of branches were the first buildings by the hand of man. A smooth stone was in the earliest times the altar to which the divinity descended to receive the prayers and gifts of mortals; a mound of earth was heaped over the bones of the dead hero, whose deeds were kept alive through sacrifices offered on the scene of his earthly labors. With the development of the race, these rude memorials assumed a more distinctive form: Burial Mounds, found in great numbers in the north of Europe, the base often surrounded with a circle of stones, and the top crowned with great flat rocks; Monoliths, high, slender stones, often almost obelisks in form, occurring singly or in groups, especially in the Scandinavian north; and the Cromlech or Dolmen, found in many parts of Great Britain and Brittany, and in Algeria and India. The remarkable Rocking Stones, so resting on one or two supports that a slight force can put them in motion like the beam of a balance, and the Circles of Stones, which surround consecrated spots, are found specially in Celtic countries. The most important of these Celtic remains in France is at Carnac, near Quiberon in Brittany, and forms a broad space covered with 4000 stone columns like obelisks, some reaching a height of 40 feet, and most standing on the thin end. Still more important is the chief heathen monument in England, at Stonehenge (q. v.), originally called Choir Gaur, or Côr Gawr, i. e., the great circle. Examples of a second stage of development are found in the stone monuments of various islands of the Pacific, and in the ancient monuments of America (see *AMERICA—A. Antiquities*). The remains of Mexico show no foreign influence in their artistic workmanship, and are therefore to be considered an evidence of an independent, national development. Some of these remains show an advanced and highly ornamented form of the pyramid.

ORIENTAL ARCHITECTURE.—The same form is found in Egypt. The whole land of the Nile was covered with a multitude of monuments, many still in good preservation, especially the colossal tombs of Memphis, and the Pyramids which lie scattered in various groups for a distance of eight miles along the spurs of the Libyan mountains, and date back as far as the fifth century B. C. The most magnificent of the Nile monuments belong to the period following the expulsion of the Hyksos, above all the monuments of Thebes in Upper Egypt, which were almost all built by Rameses the Great or Sesostris (about the middle of the 15th cent. B. C.), and his predecessors and nearest successors. In these the pyramid again appears as the oldest architectural form. The walls of the temples sloped to the top, their immense surface broken by no windows. They enclosed a long portico and were covered with richly colored inscriptions and portraits of gods and rulers. Double rows of colossal sphinxes or rams led to the high and narrow entrance, placed between two turret-like pylons and sometimes flanked by obelisks or colossal sitting statues. The grooves on either side cut into the pylon served to support high masts for banners. The narrow portal led to the unroofed court, surrounded on at least three sides by columns forming a covered gallery. In some temples this court is repeated behind a second pair of pylons, followed by a great hall or pronaos, its heavy stone beams resting on close rows of columns, of which the middle rows were higher and supported a higher roof. With this hall, which no Egyptian temple lacks, were connected the other smaller and gloomy chambers of the shrine, with the narrow, low cell of the adytum, which contained the image of the deity. These

inner rooms also were covered with painted inscriptions. The greatest of these monuments are the remains of the two gigantic temples at Karnak and at Luxor, connected by an avenue over a mile long of colossal sphinxes, the great temple-palace at Medinet Abu, and the ruins to the north with many fragments of colossal statues, of which two are still upright, one being the celebrated statue of Memnon. The monuments of Abu Simbal, Derri, and Sebna in Lower Nubia, hewn in whole or part in the solid rock, are remains of the same early period of the monuments of a later time, which differ in arrangement and shape; the magnificent temple of Dendra, near Thebes, the eastern and western temples on the island of Philæ, and the great temple at Edfu, dating from the time of the Ptolemies, are most renowned. In these the great hall of columns is almost never closed, but furnished with open galleries of columns, although never wanting the breastwork or dado and the door-posts between the columns. In front of this hall the court with its pylon is sometimes found, sometimes lacking. The temples surrounded by colonnades seem to be an imitation of Grecian temple building, only the pyramidal columns at the corners recalling the foundation element of Egyptian architecture. In works of public utility also the Egyptians excelled, especially in the water constructions for protection against the annual inundation of the Nile.

The most widely known monument of the ancient Egyptians is the Great Pyramid, the most colossal work in the world, at Ghizeh, near Cairo. The engineering knowledge and skill demanded for the quarrying, transporting, raising and polishing of the immense blocks of stone of which it is composed shows a standard of proficiency in mechanics never surpassed. The structure was designed for the tomb of its builder, Cheops, and is of solid rock, 480 feet in height, with a square base 760 feet long. The stone is laid in horizontal courses, forming steps from 2 to 5 feet in height. The entrance is on the north side, and leads to several chambers by low and narrow passages lined with smooth and closely fitting slabs. The principal chamber, nearly in the centre of the mass of rock, is called the king's chamber, and still contains the sarcophagus. Close to the Pyramid of Cheops are those of Chephren and Mencheres, the latter still preserving a portion of its coating of polished granite. The Great Sphinx, at the same place, has the crouching body of a lion with a human head, with a height of 100 feet and a length of 146 feet. Between the outstretched paws is a small temple. The Serapeum, or tomb of the sacred bulls at Sakkara, is an immense excavation 30 feet deep in the solid rock. The sarcophagi, still in their separate chambers, the ceilings of which are cut to the form of an arch, are 13 to 18 feet long, 7 to 8 feet wide, and 11 feet high, with single slabs of 2 feet thickness as lids.

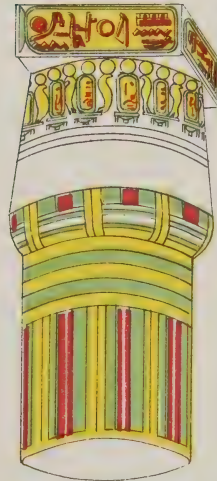
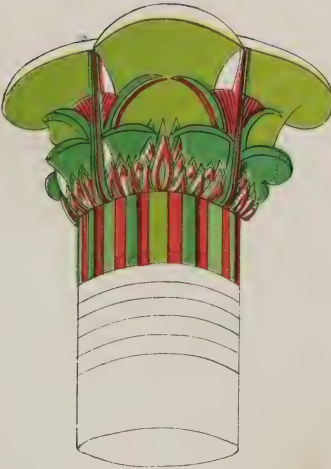
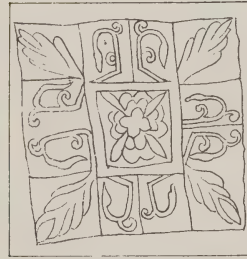
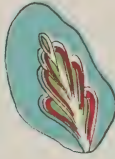
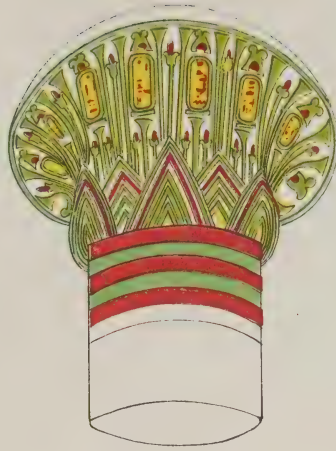
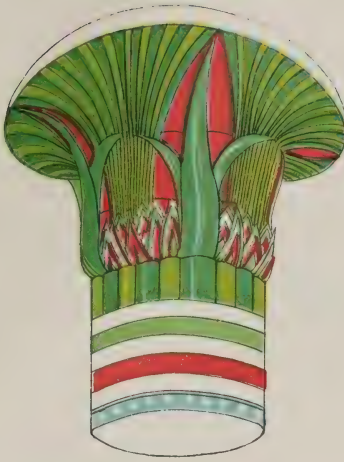
The architectures of the ancient races of Asia west of the Indus are known only from unsatisfactory accounts of writers of antiquity and from isolated remains of their works. Among the works of the once mighty nation of Babylonia is the Temple of Belus, known through the most ancient Biblical legends as the Tower of Babel, a solid pyramidal structure with a base of some 600 feet and the same height, rising in eight great diminishing stories.

To the older monuments of Babylon belong also the royal castle, its walls adorned with hunting scenes. The other ruins of Babylon belong to a later period, when a new nation arose after the incursions of the Chaldeans. To these later works belongs a second royal palace with a magnificent garden, which rose in terraces, and as the Hanging Gardens of Semiramis was later reckoned among the seven wonders of the world. The ruins of Babylon have for centuries served as quarries for the building of neighboring cities, and have thus been reduced to irregular heaps of débris. Among the ruins of Nimroud, supposed to be the remains of Nineveh, the village of Khorsabad and Kouyunjik have yielded valuable fragments. The materials are burnt brick, fastened together with bitumen and mortar.

The Phœnicians belonged to the same race of which the Babylonians formed a part, and their religion stood in intimate connection with that of Babylon. Many temples and other buildings are mentioned, but we hear most of their splendid ornamentation by means of precious metals. To the most important monument belongs the temple at Tyre, built by King Hiram. Carthage had a magnificent temple on the citadel; the inner walls of another temple in the market-place were coated with sheets of gold.

With the works of the Phœnicians are connected those of the Jews. In the reign of Solomon the old portable tabernacle was superseded by a massive temple on Mount Moriah at Jerusalem. Only a portion of its colossal foundation is preserved, but the Bible contains detailed accounts of its magnificence. About 420 years after its foundation by Solomon the temple was destroyed by Nebuchadnezzar. The new temple built by the Jews after their return, about the end of the sixth century, was only a shadow of the splendor of the old. A second restoration, begun 20 B.C. by Herod the Great, was designed to reproduce the temple of Solomon, but stood only 70 years. Some architectural details are gained from the sepulchres of Jerusalem, of which the grave of Absalom deserves special notice.

The races of Asia Minor left principally tombs, found in considerable numbers and of varied formation. The oldest and most primitive of these date back to the Lydians (700-600 B.C.), and have generally the form of a simple tumulus rising on a circular foundation (e.g., the grave of Tantalus at Smyrna). In contrast to these are the rock-cut tombs of the Phrygians, with chiseled façade, while the monuments of the Lycians



CAPITALS OF COLUMNS AND COLORED GLASS. (Ancient Egypt.)

(500-300 B. C.) show another and more developed form. The tomb was hewn out of the rock as an independent monolithic sarcophagus, or else the sepulchre was formed in the rock and a façade chiseled for it, in both cases in close imitation of woodwork. Examples are found at Phellos, Antiphellos, Myra, etc. In some cases the Greek influence is visible, use being made of the Ionic column and other Greek forms, as in the tombs of Telmissos.

During the Persian supremacy the kings held their courts principally at Ecbatana in Media, Susa, and Persepolis. Ecbatana had been the capital of the Medes, and at the beginning of the Median dominion their citadel had been built with great magnificence. It rose in seven receding stories, the roofs of which gleamed with various colors. At its foot lay the royal palace, its columns, beams and walls of cedar and cypress wood covered throughout with gold and silver. Of Susa, the building of which is ascribed to the first Persian rulers, we know that it was built in the Babylonian style. The real shrine of the Persian nation was, however, Persepolis. Here stood the old stronghold of the royal blood, here the bones of the kings were interred and their resting-places shown by splendid tombs, and here rose a new palace. The tomb of Cyrus, on the site of the old capital at Murgab or Pasargadæ, is a pyramidal structure of colossal blocks of white marble forming seven steps, surmounted by the tomb with a sloping roof of marble, which contained the golden sarcophagus of the king. The tombs of the later kings are chambers hewn in the rock with concealed entrances, designated outside by a carved façade of simple style enriched with painting. The most remarkable of all monuments of Persian architecture is the ruins of the great palace of Persepolis. They recall the Babylonian style, rising in several broad terraces.

The numerous monuments of India can be compared in extent and magnificence only with those of Egypt. The chief traits of the Indian national character, great softness of feeling and lively fancy, are seen in their architecture, in which the form is chosen not for any conventional meaning, but for its own sake. But their untrammelled fancy seldom permits the quiet necessary for a harmonious whole; it heaps forms on forms, and ends with the impression of an almost chaotic confusion. The chief remains are found in the Dekkan, the most important being the rock buildings on the west side of the peninsula near Bombay. The Brahmanical rock temples usually cover a rectangular space, with smaller chambers in connection with it. The chief court has always a flat roof supported by columns, the front row of which forms the open front of the temple. These structures are frequently connected with colonnades left open to the sky. Remarkable examples of this arrangement are found in the caves of Ellora, notably in the larger temple of Indra, and in those of the Kailasa. The Buddhist temples are not open to the outside. They consist of a long hall, closed by a semicircular wall, and divided by rows of columns. The roof of the inner space is a round vault, while that of the aisles is flat. In the circular end stands the shrine, by which the temple is recognized as Buddhist, the *dagoba*, a semi-spherical mass resting on a cylindrical foundation. This dagoba, the image of a water bubble and the always recurring symbol of transitoriness in Buddhism, generally contains some relic of Buddha or of a Buddhist saint. The extant monuments of Orissa on the east coast are temples, usually called pagodas by Europeans (corrupted from *Bhagavati*, "sacred house"). They preserve the pyramidal form, but covered so lavishly with projections, columns and niches, and with excessive painting that the design is almost lost. The chief specimens of this style are the pagodas of Tiravalur, Chillambrum and Madura.

The dagoba is found again in the *Topes* (from *stupa*, tumulus) which line the old royal road leading from India through Kabulistan to Bactria and Persia. The topes recur in Ceylon and the same style is found in the so-called Chaityas of Nepaul, where the interior has become an open vaulted chamber. The remains of Java belong to the Middle Ages, and are due to Indian colonization.

China received from India, together with the religion of Buddha, its architecture. The chief monuments were founded on a modification of the pagoda form. The Chinese Buddhists abandoned the symbolic domical structure and preserved only the terraced superstructure, which they developed into an independent style. These towers were built in many stories, each somewhat less in size than the next lower, each furnished with a sloping roof and hung with bells; the roof tiles glisten with gold, and the walls are gaily painted or covered with gleaming porcelain. The Porcelain Tower of Nankin is one of the most celebrated structures of this kind. The temples of the Chinese are usually of small dimensions and are usually enclosed with columns, but the most important are surrounded by courts and colonnades of various kinds. In their architectural character they differ little from the courts and halls of private dwellings. Monuments to celebrate the deeds of deserving persons consist of gateways (*palu*) built across the street, with either one or three archways built of stone or wood. The Chinese excel in public works, to which belong the massive wall for protection against the Mongols, and the extensive system of canals which unites the east-flowing rivers and provides a complete water-communication.

GRECIAN ARCHITECTURE.—We may consider as the first stage of the development of Grecian architecture the creations belonging to the Heroic Age. The simplest monuments mentioned in the Homeric Hymns are the tombs of fallen heroes; mounds containing the ashes of the dead, and crowned with rough-hewn rocks. The most im-

portant works were strongholds, the mighty walls of which, later called Cyclopean walls, were built of polygonal blocks of stone. The extant remains, which show a gradual progress in technical skill, are formed in part of colossal rough stones, the interstices filled with smaller stones, in part of more or less carefully cut stones carefully fitted into each other. The effort to lay the stones in horizontal layers finally led to regular building in parallel courses. The gates found in these walls are of various forms. Their sides have generally an inclination produced partly by the projection of the upper stones, partly by large inclined posts. Their covering is frequently gabled either by the projection of the courses or by stone rafters leaning against each other, and more rarely by horizontal beams. The most celebrated of these is the Lion Gate at Mycenæ, in which the pressure over the gateway is divided by means of a triangular stone bearing two lions in relief, raising themselves against a column. The excavations of Schliemann have yielded but incomplete plans of the dwellings of the chiefs of those times (see MYCENÆ, ORCHOMENOS, TIRYNS, TROY), and have not carried our knowledge beyond the stage of conjecture. The so-called Treasuries for the storing of the wealth of the chiefs were subterranean, circular chambers, built in circular parallel projecting courses and covered with a flat rock. Of these the Treasury of Atreus, at Mycenæ, is the most remarkable and best preserved. Though Schliemann's excavations have given us no positive description of the homes of the heroes, yet we owe to them extensive material in support of the evidence that Grecian architecture is an offshoot of the oriental, and that Greece developed from Asiatic and Egyptian sources those forms of harmony of which the most splendid symbol is the Greek temple. The oldest temples are at the same time the oldest productions of Greek national art. The temple in its original form consisted only of the rectangular cella, in which the image of the divinity stood, and of an open pronaos, which in larger edifices was afterward extended around the whole building. When the temple form had reached its highest point, the architectural support was formed by the rows of columns, which rose from a common platform of several steps and received the architrave. Above the architrave was the frieze designed for sculptured ornament. Over the frieze was the cornice, its chief member, a boldly-projecting surface, forming a finish to the frieze. At the ends of the building rose the gable, the form of which, a flat triangle, was fixed by the form of the roof, and which contained the chief sculptures. According to the employment of a single or double system of columns, only on the front or on all sides of a temple, it is described as in *antis*, *prostyle*, *amphiprostyle*, *peripteral*, *pseudoperipteral*, *dipteral*, or *pseudodipteral*. The number of columns in front, always even because of the doorway, give the names *tetrastyle*, *hexastyle*, *octastyle*, etc.

The temple consisted of the cella (naos), usually without windows, and of the court (pronaos), connected by a large doorway with the naos. In some temples there is found behind the cella an enclosed chamber (opisthodom), serving as treasury. The amphiprostyle usually had in the rear a hall (posticum) corresponding to the pronaos. In temples of greater extent, intended to accommodate larger numbers, the cella was extended into an open court, hypæthron, surrounded by colonnades. Grecian architecture received a twofold stamp from the peculiarities of the Doric and Ionic races. The Doric temples are of heavier proportions. The columns stand at intervals of $1\frac{1}{4}$ – $1\frac{1}{2}$ their lower diameter, their height being only four to five times the lower diameter, and taper to about five sixths of the diameter. The height of the entablature and gable is $\frac{1}{4}$ – $\frac{1}{2}$ the height of the columns. Among the most perfect specimens of the Doric style are the Theseum and Parthenon at Athens, and the Temple of Zeus at Olympia. In the Ionic order the proportions are lighter and freer, and the whole bears the stamp of majestic grace. Great delicacy of form is shown in the Temple of Athens at Priene, and in the Erechtheum on the Acropolis at Athens.

Next in importance to the temples themselves were the Propylæa or halls which gave entrance to the precincts of the sanctuary. They resembled the temples in exterior appearance, but differed in the absence of the cella walls, forming an open passage. Examples are preserved in Athens and Eleusis. The halls destined for other purposes were either provided with open colonnades supporting a common roof, or separated from the outer life by walls outside the colonnades, or arranged in the manner of hypæthral temples. To this class belong the Basilicas, halls of judgment, which however gained their higher significance only in the period of Roman art. The usual plan of private dwellings in the later Alexandrian time is the following. The most important feature was a court of columns, around which were grouped the men's apartments; further back the women's apartments, with which guest chambers were often connected, separated from the main house by intermediate courts. Other extensive buildings were those designed for theatrical, gymnastic and musical performances; such were the recovered theatre at Segesta, and above all, the fully excavated Olympia. In connection with the musical contests stand the Choragic monuments, erected to commemorate a musical victory, which were either columns or complete structures supporting a tripod, or chapels containing the trophy. A work of this class is the monument of Lysicrates at Athens, in the form of a round temple. The tombs were usually simple, of slender columns with sculptures of flowers, sometimes in the shape of an altar, or were excavations in the rock, with ornamental façades. Some specimens of Grecian architecture of the latest period, as the Tower of the Winds at Athens, contain foreign forms.

ETRUSCAN ARCHITECTURE.—An important link in the history of classical architecture was formed by those artistic attempts of Italy which prepared the ground on which afterward the Græco-Roman art arose. The remains of the ancient inhabitants of Italy display the same tendency which we perceive in the Greek works of the heroic age. The only architecture which attained a characteristic development was that of the Etruscans. To the most ancient remains of old Italian architecture belong the walls of the ancient cities, which are frequently built in the cyclopean manner of the Pelasgic inhabitants of Greece. In the structures of this kind in Etruria, as well as in the walls of Volterra, Fiesole, Cortona, and Populonia, there is a visible attempt to lay the stone in horizontal courses, so that they stand between the polygonal and parallel. With these are related the structures corresponding to the old Greek *Thesauri*, their chambers covered with domes consisting of projecting circles of masonry. Subterranean chambers of this kind are found at Norba, Vulci, and Tarquinii; Rome possesses a similar structure in the *Carcer Mamertinus*. Beside this form of construction the Etruscans employed vaulting of arches, seen in the old gates of Volterra and Perugia. Among the mightiest vaulted constructions of the Etruscans are the cloacæ at Rome and canal built in 393 to drain the Alban Lake. Etruscan tombs are of three varieties. The first consists of a mound of earth rising from a stone platform. To this class belong the monument in the necropolis of Vulci, called the *Cucumella*, and the so-called grave of the *Horatii* and *Curatii* at Rome. The second kind is cut in the rock, with sculptured façade; examples are very numerous at *Orchia* (now *Norchia*) and *Aria* (now *Castel d'Asso* or *Castellaccio*), near *Viterbo*. The third class consists of tombs cut in the tufa rock and wholly subterranean. A narrow passage or staircase leads to a hall around which the tomb chambers are grouped. Sometimes short rectangular pillars have been left in these chambers to support the roof of the many tombs of this kind; the most interesting are those in the necropolis at Vulci. No remains of Etruscan temples exist, since their superstructure was of wood. Of Etruscan theatres the remains at Fiesole are the chief. To the Etruscans, finally, is due the first development of the Roman dwelling which differed from the Greek in arrangement, substituting for the open court of the Greeks the more enclosed atrium.

ROMAN ARCHITECTURE.—The Romans were a people without artistic inclination. Whatever architectural work was done at Rome in the first centuries of the state was due to labors or influence of the neighboring Etruscans. With the contact of Greek and Roman culture came the transference of Grecian art to Rome. The two form-principles united in Roman architecture are the Grecian columnar and the Italian vaulted forms, the latter appearing through all their building operations enlivened by the application of the former. The simple orders of Grecian architecture, the Doric and Ionic, were seldom employed by the Romans. Instead, the Corinthian column predominated, the rich foliated capital of which better expressed the striving for splendor and effect than the more geometrical forms of the other two orders. Roman architecture was characterized by the free use of vaulting. The oblong halls are covered with vaulted roofs, producing rich combinations. The arch appears everywhere as an independent monument spanning the streets. Temples of many varied styles were built, partly after pure Greek models, and partly with peculiar application of the vault principle; and buildings of the most varied character demanded by the luxury and needs of the Romans were erected, among them the basilica. Temples and public buildings surrounded the Forum, itself a characteristic architectural development, forming an imposing whole. The *Thermæ*, the chief resorts for health and public amusement, combined in themselves a whole world of magnificence and luxury. Gigantic structures, theatres, amphitheatres, *naumachiae*, circuses, were erected; public works of almost indestructible strength were constructed, of which the military roads, bridges, public fountains, and the aqueducts with their massive arches are the most remarkable. The greatest magnificence was displayed in the monuments of illustrious men, the columns of victory, bearing the trophies, the majestic triumphal arches, and the tombs, which were erected in varied forms and were sometimes of gigantic proportions; while the splendor of private houses, palaces and villas vied with that of the public buildings.

The rapid progress of Roman architecture at the beginning of the third century B.C. is seen in the construction at that period of the great military roads and aqueducts (q.v.), among which the *Via Appia* and the *Claudian Aqueduct* are conspicuous. At the same period the Roman Forum was extended and beautified. The architecture received a second impetus at the beginning, and still more toward the middle of the second century B.C., when, after the conquest of Greece, Greek works of art and Greek taste were transplanted to Rome, and when the Romans began to employ marble, the customary material of the Greeks, in their great buildings, which till then had been constructed of the coarser peperino. The Forum was again transformed and surrounded with extensive basilicas, colonnades designed for halls of public trade and justice. Of the works of this period little has come down to us, the most important being the *Tabularium* on the slope of the Capitol Hill. The remains of *Pompeii* show the transition between Grecian and Roman architecture. The highest development of the latter began with the time of *Julius Cæsar*, by whom the great undertakings were begun, which Augustus completed. Under Augustus a new and more magnificent Rome arose. He could boast of leaving the city of brick which he found, a city of marble. This however was principally true

of the new parts of the city which he added. The old city for the most part remained in its former irregular construction ; not until Nero by his conflagration provided it was there space in the heart of the city for extensive building. Vespasian built a splendid new Capitol, which was still more splendidly by Domitian restored after a fire. Trajan erected still more magnificent structures, among which his Forum cannot be too much admired. Neither were the provinces forgotten ; new and splendid cities arose on all sides. Down to the time of Hadrian the style of Roman architecture preserved nearly the same degree of excellence, and not until the second half of the second century A.D. do we perceive a gradual falling of taste. The most important edifices of ancient Rome which are still preserved are the Pantheon, built by Agrippa 26 B.C., and the Temple of Venus and Roma, built by Hadrian 135 A.D., the largest of all the temples of Rome known to us. The theatres, among which the Theatre of Marcellus is conspicuous, were modeled after the Greek theatres, while the amphitheatres, like the Colosseum at Rome, and those at Nîmes, Arles, Verona and Pola, exhibit the Roman style of architecture. The Baths of Caracalla, from the early part of the third century, and those of Diocletian, from the beginning of the fourth, were conspicuous through their immense size and magnificence. Of the bridges of this period there remain the more simple Pons Ælius (now Ponte Sant'Angelo) and the Ponte Rotto (Pons Palatinus or Senatorius) at Rome, as well as the Bridge of Augustus at Rimini. Of commemorative columns we have the columns of Trajan and Marcus Aurelius at Rome. The Triumphal Arches show Roman art in its characteristic form and in all its majesty. The earliest of those preserved are the arches of Augustus at Rimini and at Susa in Piedmont, and the Arch of Victory at Aosta, the earliest in Rome being the Arch of Titus, after which come those of Septimius Severus and Constantine. The tombs are partly subterranean, without important developments of architectural form, partly more or less remarkable structures above ground. The subterranean tombs are cut in the rock, like the catacombs of Rome, Naples, Syracuse, Malta, Alexandria, etc., or are of vaulted mason work like the tomb of the Furia family at Frascati. Remains of interesting monumental tombs above the ground are those of the so-called Tomb of Virgil at Posillippo, the so-called Tomb of the Servilli at Rome, the Tomb of Cæcilia Metella, dating from the time of Julius Cæsar, at Rome, and that of the Plautii at Tivoli. The ancient form appears magnified in gigantic proportions and decorated with the richest artistic ornamentation in the Mausoleum of Augustus in the Campus Martius, and in the Mausoleum of Hadrian, the lower portions of which form the foundation of the present Castel Sant'Angelo. The pyramidal form appears in the lofty Pyramid of Cestius at Rome, of the time of Augustus. The Roman house construction, which is related to the Pompeian, and of which the house of Pansa at Pompeii is a type, differs from the Grecian in its less distinct separation of the women's quarters from those of the men, and in the combination of the Italian (Etruscan) atrium with the rooms representing the Grecian architecture. A new phase was presented in Nero's so-called Golden House, the rooms of which gleamed with gold, precious stones, etc., and which embraced whole fields, vineyards, and groves within its limits. Domitian founded a new imperial palace on the Palatine, and later emperors continued the work. Hadrian's villa at Tivoli was of vast extent, and consisted of dwelling rooms of the most various kinds, numbers of large and small halls, several theatres, baths, etc.

With the beginning of the third century A.D. a desire arose for greater ornamentation, which was applied everywhere, so that frequently the main design was obscured and lost. But in the midst of the decay of the art of the old world, the principles of a new development arise, showing a more independent use of the vault and arch, partly in a peculiar employment of groining, partly in resting the arches directly on the pillars. The motive of this new development must probably be sought in the East, where many great constructions were carried out at this period, among them the buildings of two cities of Syria, of which remains have come down to us, Palmyra (Tadmor) and Heliopolis (Baalbek). In these the overloading and division of the architectural masses is very conspicuous. Ruins still remain of the great palace which Diocletian built for himself at Salona (now Spalato) in the beginning of the fourth century. This formed a great rectangle, surrounded with walls and towers, divided in the manner of a Roman camp, with many colonnades and halls, temples and dwellings for the Emperor and his suite. Among the characteristic remains of this period at Rome are the fragments belonging to the palace of Nero ; a temple of Sol, built by Aurelian ; the Temple of Vespasian (wrongly called the Temple of Concord) in the Forum ; the Janus Quadrifons, in the Forum Boarium, of the time of Constantine ; the Basilica of Constantine in the Forum Pacis, and the Basilica Constantia outside of Rome, now the Church of St. Constantia. Through Constantine, who transferred the imperial seat to Byzantium, many important structures were erected in that city, in many cases in imitation of the works of ancient Rome.

EARLY MEDIEVAL CHRISTIAN ARCHITECTURE.—The triumph of Christianity introduced a principle essentially different from the style of all the heathen antiquity. While the heathen temples were based upon the idea of the bodily presence of the god, and only the outer courts gave artistic expression of the divinity, the Christian church was designed to lift the assembled congregation above earthly thoughts, and its form was molded by this design. The oldest Christian architecture, therefore, was based upon the basilica, which was intended to contain large gatherings. The earliest Christian

churches, built on the model of the basilicas, did not differ from them in any essential; but as early as the end of the fourth century a new and peculiar development manifested itself, which grouped about the larger basilicas new forms; smaller basilicas and chapels, rectangular or round (see *BASILICA*). Among the first basilicas of Rome are the old church of Santa Maria Maggiore and S. Paolo Fuori, built by Theodosius. A peculiar architectural style was developed in the fifth and sixth centuries in the Byzantine nation. The vault was freed from the constraint imposed by the foreign Greek forms; massive pillars, connected by great arches, bore the domed roof. The main edifice was connected with others, domed or vaulted, and the circular form showed itself even on the exterior, taking the place of the gable. Both systems of Christian architecture, the basilica and the Byzantine, spread from their chief centres, Rome and Constantinople, and underwent various modifications, as shown in the remarkable buildings of Ravenna. In these the form of the basilica predominated, although the treatment of details is frequently Byzantine. Remains are preserved of most of these buildings, among them the interesting Mausoleum of Theodoric (now the church of S. Maria della Rotonda); on the other hand, few remains exist of early Christian architecture in France, Germany and England. In Germany, Aix, the capital of Charlemagne, enjoyed the special favor of the great ruler, through which, as we learn from contemporary writers, it became a second Rome, and had its forum, theatre, baths, aqueducts, etc.; but of these we have no further details. Near the palace there, and connected with it by a portico, Charlemagne erected a church to the Virgin, which still stands, and is the best specimen of old Christian building north of the Alps. The numerous and sometimes splendid buildings erected during the seventh and eighth centuries in England under the rule of the Anglo-Saxons, as well as the Christian buildings of Spain, have perished. The first Christian buildings of the Eastern Roman Empire were also basilicas. The chief churches which Constantine built in Constantinople were undoubtedly Roman, among them the Church of St. Sophia. The great church at Bethlehem, said to have been erected by the mother of the Emperor, St. Helena, is a large basilica. Some of the Coptic churches in Egypt and Nubia, which show the basilica form, are of very ancient models, and date back to the earliest period of Christianity.

After the church of St. Sophia was burned in 530, Justinian undertook its rebuilding, and in the new church the Byzantine style developed its fullest and most characteristic form. The invention of the new style is due to the architect Anthemius of Tralles. The building was completed in 537, and, except some restorations under later emperors, and some slight changes since its transformation into a mosque, still remains in its original form. The church remained as the pride and model of Byzantine architecture, and was imitated in many other churches, even at the time of Justinian. A feature of Byzantine architecture is seen in the cisterns, built in great numbers in Constantinople since the time of Constantine; they formed great reservoirs for water, the vaulted and domed roofs of which were supported by columns. The cisterns situated west of the Hippodrome, called Binbirdirek (the cisterns of 1001 columns), were of immense extent, and connected with a system of aqueducts. The Russian development of Byzantine architecture shows Asiatic influence in the substitution of lofty towers and minarets for the dome, crowned with small domes, hemispherical, egg-shaped, or pear-shaped. The exterior is covered with ornamentation, Byzantine, modern Italian, Arabic, and other, painted in bright colors, the domes usually gilt. This style had spread over all Russia when Peter the Great, in the beginning of the eighteenth century, began to introduce modern European architecture, which has since gradually obtained predominant influence on Russian art.

SARACENIC (MOHAMMEDAN) ARCHITECTURE.—The new religion of Islam, which after 610 spread first through Arabia, brought a new development in architecture. Possessing no distinctive forms of their own, the Saracens were obliged at first to borrow from existing styles. In their mosques we meet with two types, derived from the basilica form and from the Byzantine. Mosques of the first type are large, quadrangular courts surrounded with colonnades; the enclosing walls have no special architectural characteristics. In the court a fountain covered with a small dome-shaped roof is invariably found, as in the early Christian basilicas, and beside the wall rises the slender minaret from which the muezzin calls the hours of prayer. In the second class of mosques the principal arm of the building is covered with a dome, and the wings are also domed and joined with it in the Byzantine style. The imposing mass is lightened by minarets which spring from the corners of the building. In the arches we meet with a more distinctive oriental character. The semicircular arch is seldom used; a larger portion of the circle gives rise to the striking horse-shoe arch, which is found chiefly in western regions, especially in Spain. Another form of arch is pointed, formed by two intersecting arcs, and is undoubtedly derived from oriental sources. It is found in Persia in ruins of the time of the Sassanids (226–651 A.D.), and in Egypt in remains of the earliest period of the Moslem dominion. In the use of all these forms there is no organic relation between the arch and its supports, both parts remaining as independent as in the later Roman and early Christian architectures. The further developments of detail in Saracenic art belong rather to ornamentation than to architecture. All flat surfaces were covered with raised or colored work, which gave to Saracenic architecture a richness unequalled in other styles. The ornamentation was, however, confined to a very re-

stricted field. It rests upon an abstract, unvarying formula which finally wearies the eye (see *ARABESQUE*). In the most important places decorated in this way, inscriptions, or verses from the Koran, take the place of representations of natural objects, which was strictly prohibited by the Mohammedan religion. A peculiar development is seen in the pendentives, which originated in the necessity of forming a union between the intersection of flat surfaces and a vault. These forms consist of small independent series of vaultings rising in successive tiers until the required space is filled, or hanging downward from the junction of two vaults in the form of a stalactite.

The Moorish architecture of Spain is as distinguished from that of other Mohammedan races as the history and life of the people who produced it. Among the older edifices the Mosque of Cordova is most prominent. The royal palace of the Alhambra (q. v.), erected in the second half of the thirteenth century, shows the later development of Moorish architecture in all its romantic splendor. The characteristics of the latest period of the Moorish style are shown in the buildings of Seville, notably in the Alcazar (royal castle).

The style of the Mohammedan remains of Egypt stands midway between the styles of Moorish architecture and the eastern Asiatic peoples. The buildings of Cairo are specially important, among them the Nilometer, a rectangular structure containing an ornamental column on which the rise and fall of the water was noted. The oldest of the mosques of Cairo is that of Amrou, founded in 643, and rebuilt after a fire in 897. In the Mosque of Tooloon, founded in 885, and said to have been completed by a Christian architect, broad piers take the place of columns, supporting broad, pointed arches.

In Sicily, which the Arabs conquered in 827, two Arabian palaces, Zisa and Kouba, are preserved at Palermo. In European Turkey, especially in the edifices of Constantinople, which belong to the later period of Mohammedan architecture, the Byzantine style is combined in a not very organic conglomeration of cupolas, half cupolas, and arches with the oriental minaret—a more or less Arabic treatment of details, and the use of inscriptions as ornaments.

In India the region of the Ganges is very rich in the most splendid monuments, of which some date from the earliest period of the Mohammedan supremacy. In Delhi, among other remains of this period, is the Kutab-minar, the minaret erected by Kutab as a triumphal column of Islam. The edifices erected under the Great Moguls belong to the most beautiful productions of Mohammedan art. The body of the building as a rule rises in a compact, rectangular mass, its outer side covered with niches or regularly recurring openings. The minarets harmonize with the whole, and have not the exaggerated slender proportions of the Turkish. The portals are usually of considerable height, formed by a pointed niche, and flanked by minarets. The pointed arch is used throughout, curved toward the point and set in a rectangular framework. The most celebrated of these buildings belong to the reign of Shah Akbar the Great (1556-1605) and his son, Shah Jehan (1605-58), and are found at Delhi and Agra. Shah Jehan built at Delhi forty great mosques, of which the Janina shows the style described above in its greatest magnificence.

ROMANESQUE ARCHITECTURE.—The name Romanesque is somewhat vaguely applied to the transitional style of architecture which, about the tenth century, was developed from the existing Roman and Christian types. The ground plan is that of the basilica, but the flat roof is replaced by round vaulting, and the columns by pillars supporting round arches, while unity in the design is secured by intersecting vaulting instead of isolated domes. Romanesque ornamentation often displays a fantastic tendency, uniting human forms and beasts, dragons and fabulous creatures of all sorts with luxurious foliated carvings. This style, first applied to church building, was later used in less extensive edifices, and at last even to dwellings.

Romanesque architecture is seen in great splendor in the cloisters of St. Paul's without the Walls and of St. John Lateran at Rome, in the basilica of S. Piero in Grado in Toscana, in the Cathedral at Pisa, and in the church of S. Miniato at Florence, all belonging to the first half of the thirteenth century. Among the Romanesque buildings of Venice which show a distinct development of this style, at the same time containing many Mohammedan architectural features, is the Church of St. Mark, begun in 976 and completed in 1071 after the original design. Its plan is that of a Greek cross, surmounted by five cupolas, borne partly by columns. The interior of the cupolas, as well as the upper portions of the walls, is decorated with mosaic on a gold ground, while the lower parts of the walls and the floor are of fine marble. Among the Romanesque edifices of Lombardy are the cathedrals of Cremona, Piacenza, Parma, and Ferrara; while the chief Romanesque work of Spain is the cathedral of Tarragona. One of the oldest Romanesque edifices of France is the church of St. Front at Périgueux. Among the churches of southeastern France, which still show motives borrowed from the old Roman constructions of that region, are Notre Dame du Port at Clermont, in Auvergne, and the churches of Issoire, Brioude, and Puy en Velay. The edifices of western France are heavier in form, more arbitrary in composition, and overloaded with ornament. A good example of this barbaric splendor is seen in the church of Notre Dame la Grande at Poitiers. The character of the edifices of northern France, where the Germanic Normans founded an independent culture, is essentially different. Their works show the system of the vaulted basilica but so consistently carried out that Normandy must be

considered the source of the first independent development of the style. One of the oldest examples of the Romanesque style is the church of St. Georges of Bocherville, near Rouen, built between 1050 and 1066, while the older portions of the Cathedral of Bayeux date from the second half of the twelfth century. The most complete example of the Norman style as developed in England under the Norman supremacy is the Cathedral of Norwich, founded in 1096. The oldest German edifices of the period belong to the end of the tenth century. The Cathedral of Trèves, with its antique pilasters, is an early Romanesque work of great merit. The most important developments of the vaulted basilica are seen in the three cathedrals of Mayence, Worms, and Speyer. A similar style is shown in the Romanesque churches of Belgium, especially the churches of St. Servatius at Maestricht, Notre Dame la Chapelle at Brussels, and the Cathedral of Tournay; while the highest stage of Romanesque decoration is found in the oldest part of the Cathedral at Freiberg, especially in its so-called "Golden Gate."

GOTHIC ARCHITECTURE.—Gothic architecture, which followed immediately upon the complete development of the Romanesque, is grounded on the system of the vaulted basilica, as developed during the Romanesque period. The ground plan of the churches remains essentially the same, but the striving for architectural unity becomes much more prominent. The pillars and half columns, which carry the arches and vaults, in Gothic church architecture rise independently, and their lines are carried out in those of the vaulting. The use of intersecting ribs distributed the weight of the vaulting and permitted the thickness of the walls to be reduced, while the thrust of the vault was received by buttresses. This reduction of the load and concentration of the resisting mass was not permitted by the round arch, which, besides, did not allow the intersection of vaultings of different diameters at the same height. In the application of the pointed form an arch was obtained which permitted great variation in height and breadth without loss of its distinctive character. The Gothic style was also eminently suited to exterior and interior decoration. The interior contains the most numerous and important carvings, enriched by the colors of the stained glass of the windows. The exterior unites sculpture with architectural form; the doorways especially are richly decorated with figures and plants, and the pinnacles of the buttresses often take the shape of tabernacles in which upright statues are framed.

The first development of Gothic architecture is seen in the northeastern portions of France, as is proved by the numerous monuments of Isle de France, Champagne, Burgundy, and the neighboring districts. To the older edifices belongs the Cathedral of Notre Dame at Paris, begun in 1163 and completed in 1360. Other examples are the choir of the cathedral at Rouen (1212–1280), the Cathedral of Laon, the church of Notre Dame at Dijon (1252–1334), the cathedrals of Senlis, Auxerre, etc. The Cathedral of Rheims (1211–1250) is one of the most splendid specimens of the Gothic style. The architectural character of the Cathedral at Amiens (1220–1288) approaches the freer development of the style which was already taking place in Germany. The Palais de Justice and the Hotel de Bourgtheroulde in Rouen, and the castle of Fontaine le Henri at Caen, are characteristic examples of late Gothic palatial architecture. Other examples occur in Lorraine, and especially in Burgundy, so that this style is sometimes called the Burgundian. The same original system of Gothic architecture which rose in northeastern France appears also in the Netherlands. Its development in that country was, however, very one-sided, and the exteriors often have a heavy character. To this period belong most of the Gothic churches in Valenciennes, Lille, Bruges, Ghent, Brussels, Louvain, Malines, Antwerp, etc. The Dutch churches at Rotterdam, Delft, the Hague, Leyden, Haarlem, Amsterdam, etc., are specimens of the plainest architecture; the only exceptions being the churches belonging to the later period of the style, the Cathedral at Antwerp, the churches of St. Peter at Louvain, St. Martin at Hal, and St. Salvator at Bruges. The church of St. Gudule in Brussels is distinguished by its beautiful façade of the beginning of the sixteenth century. The municipal buildings of the Netherlands developed a very high excellence in architecture and decoration. The finest examples are the town halls of Louvain (1448–1469), Brussels, Ghent, Bruges, Oudenarde, Arras, and Mons. A distinguishing feature of these buildings is the lofty clock tower or belfry.

The Gothic style was introduced in England almost as early as in France, and not uninfluenced by French art. But in England the style took a direction quite different from the French treatment. The beginnings of Gothic architecture in England are seen in Canterbury Cathedral and the Temple Church in London; Salisbury Cathedral shows the first independent development of the style as a whole and in all its details. Exeter Cathedral shows a stricter organization of the style, while Westminster Cathedral, begun in 1270, approaches the system of French cathedrals in its plan. The noblest and purest application of the Gothic is seen in York Cathedral (1291–1330), and in the contemporary chapter-house of the same cathedral. In some examples of the Gothic style in England a national decorative element is developed to a richness attained nowhere else, as in the transept of Gloucester Cathedral (1381), the Lady Chapel of Peterborough Cathedral, and St. George's Chapel at Windsor. The development of English Gothic is usually divided into three periods—Early English (thirteenth century); Decorated (fourteenth century), and Perpendicular (fifteenth and sixteenth centuries).

In Germany the Gothic style came into general use somewhat later than in France

and England. The oldest known examples show the contest still going on between Romanesque and Gothic. The first appearance of the style in Germany is seen in the nave of the Church of St. Gereon at Cologne (1212-1227) and in the Cathedral of Magdeburg, begun in 1208 or 1211. In western Germany the Cologne Cathedral, founded in 1248, is the most perfect masterpiece of Gothic architecture. The other most important examples of the style are the Cistercian abbey of Altenberg at Cologne, the Cathedrals at Metz, Freiburg, Strassburg, Magdeburg, and Halberstadt. Good examples of the further German development are seen in the Cathedrals of Regensburg, Prague (1343-1385), and Ulm (1377), and St. Stephen's at Vienna. The German Gothic developed many excellent forms for the decoration of public and private buildings, as is shown in the many works of this kind in Regensburg, Ulm, Nuremberg, Coblenz, Münster, etc. Gothic town halls are comparatively rare in Germany, since the older buildings of this class were in most cases rebuilt during the Renaissance.

One of the earliest Gothic edifices in Italy is the church of S. Francisco, at Assisi (1218-1230), and a little later the church of Sant' Antonio, at Padua. The interior of the cathedral at Siena, begun about the middle of the twelfth century, has noble proportions, but the construction is essentially Italian. The Campo Santo and the little church of Santa Maria della Spina, at Pisa, the cathedral of Arezzo, and the church of Santa Maria Novella, at Florence (1279), are of a similar character. The church of Santa Croce, at Florence (1294), and the cathedral of Santa Maria del Fiore, both by Arnolfo di Cambio, are types of the Italian style. By far the greatest of all Gothic church edifices in Italy is the cathedral of Milan. The Gothic style was frequently used and most richly developed in Italy in the façades of palaces and public buildings. These offer examples of the highest point reached by the Gothic in Italy. While the Palazzo Vecchio of Florence and that of Siena, both of the thirteenth and fourteenth centuries, are heavy, castle-like structures, the Loggia dei Lanzi and the Loggia dei Mercanti, at Bologna, are of noble proportions and great merit. In the public buildings of some Lombard cities, as at Como, Cremona, and Piacenza, there was developed a style of decoration which made a happy use of Romanesque and Saracenic elements. Above all, the palaces of this period in Venice are of a characteristic and pleasing form, among them the Ducal Palace built in the fourteenth century.

In Spain and Portugal the Gothic style seems to have preserved far greater purity than in England, yet not without being influenced in many respects by Moorish architecture. To the Spanish churches of this period belong the cathedrals of Burgos (1299), Barcelona, Segovia, and Seville, the church de los Reies, at Toledo (1494-1498), and the Dominican Church at Valladolid. The noblest and most regular example of the Gothic style on the whole Iberian peninsula is the cloister church of Batalha, in Portugal, the interior of which at least approaches the best German Gothic edifices.

ARCHITECTURE OF THE RENAISSANCE.—The newer architecture of the Renaissance, which in its latest development reaches to our own times, originated in the revival of the antique, and more particularly the Roman style of architecture. This developed first in Italy, whose works became models for other countries, and reached its height in the 15th century. Palace architecture was the earliest form of this period, the church buildings being of secondary importance. The best of the latter show a tendency to return to the simple basilica form. Later appeared Roman arches, with massive columns, or domed in the Byzantine style. Of the various schools of architecture, the Tuscan is the most important; and at its head, the founder of modern architecture, stands Filippo Brunelleschi (1375-1444), builder of the great dome of the cathedral at Florence, the churches of San Lorenzo and San Spirito, and the Pitti Palace. The last remained for a long time the type of Florentine palaces. Other distinguished Florentine architects were di Greccio, da Majarco, Pintelli, who built many churches in Rome, as Santa Maria del Popolo and the Sistine Chapel, and Alberti (1398-1472), who distinguished himself by earnest study of the monuments of antiquity.

The Venetian palaces of this time, by their peculiar grace and elegance, show a marked contrast to those of Tuscany, and as well as the churches have a tendency to the Byzantine style. The chief Venetian palaces are the Palace Pisani a San Polo, the Palaces Angarani and Dario, the Palace Corner-Spinelli, the Palace Contarini, and the Palace dei Camerlenghi, by the Ponte Rialto. Among the ecclesiastical buildings are San Zaccaria, the Scuola di San Marco, and the Scirolo di San Rocco. The Fondaco dei Tedeschi is the work of Fra Giocondo, a learned architect of Verona.

At the beginning of the 16th century, under the influence of Alberti, an increasing strictness in the imitation of antique architecture resulted in a purer style. From this time the rules derived from antique monuments and from the writings of Vitruvius were firmly adhered to. Rome now became the most important centre of Italian architecture. The first great master of this new tendency is Donato Lazzari, usually called Bramante of Urbino (1444-1514). His buildings in Milan show the graceful forms which characterize the North Italian architecture of the close of the 15th century. Later at Rome the immediate presence of the monuments of ancient Rome seem to have impelled Bramante to a closer reproduction of their forms. Closely allied to Bramante is Baldassare Peruzzi (1481-1537), who built several palaces at Rome, as the so-called Farnesina, while his pupil, Sebastiano Serlio, is best known by his work on architecture. The principal followers of Bramante at Rome were Antonio da Sangallo, from Florence

(died 1546), the builder of the Farnese Palace, which in its noble and beautiful proportions shows the influence of the older Florentine style, and Piero Ligorio (died 1580), who has left in his Villa Pia, in the Vatican Gardens, the finest example of an ancient villa. An entirely different direction was given to Italian architecture by the work of Michelangelo Buonarroti (1474-1564), the builder of St. Peter's. His capricious and arbitrary style is in marked contrast to that of the earlier masters and that of his contemporaries as well, but found few adherents in the century following his death. As Leo Battista Alberti led the movement which spread widely in the 16th century, Michelangelo may be regarded as the founder of the taste which characterized the 17th century. His aim was to impress the spectator by the power of his works, and to fill him with astonishment by bold and unexpected combinations, without regard to the purity or real necessity of the means by which he accomplished this object.

Outside of Italy Gothic architecture was in general use among the countries of Western Christendom till the 16th century. Renaissance was introduced into France from Italy at the beginning of the 16th century.

The artistic enterprises of Francis I. gave the new style a more rapid and an easier entrance than in other lands. The most noted French architects of this time were Jean Bullant (Castle of Ecouen, about 1540), Pierre Lescot (the older part of the Louvre), and Philibert Delorme. In the first half of the 17th century Jacques de Brosse deserves special mention; he built the Luxembourg Palace in Paris, which recalls the Florentine style. The buildings of the latter part of the 17th century, under Louis XIV., are without special importance. The principal architects were Claude Perrault and Mansard, inventor of the roof called by his name. The French architects of the 18th century are generally very insipid; only Jacques Germain Soufflot (1713-81), who built the dome of the church of Ste. Genevieve, deserves mention. The French designate the changes of styles by the sovereigns of the time, as Francis I. style, Henry II., Louis XIII., Louis XIV., Regency, and Louis XV.

Renaissance architecture was introduced into Spain also in the first half of the 16th century. In the reign of Philip II. the cloister San Lorenzo in the Escorial was built by Juan de Toledo and his pupil, de Herrera. In England the new style of building hardly found acceptance before the beginning of the 17th century. Inigo Jones (1572-1652) may be called the founder of this movement. His chief works are the palace at Whitehall and part of the Hospital at Greenwich. The most important modern English architect is Christopher Wren, who carried on the rebuilding of St. Paul's, in London, from 1675-1710; in England also they use the terms Elizabethan style, Queen Anne style, etc. In the Netherlands Jacob van Campen (died 1658), the architect of the great town-hall at Amsterdam, is worthy of mention.

After the middle of the 16th century many buildings in the Italian style were erected in Germany, e.g., the Otto-Heinrichsbau of the Heidelberg Castle. But the German spirit soon so fully appropriated the antique decoration and gave it so distinct a national character that German Renaissance became a separate and independent branch of the universal Renaissance movement. At the beginning of the 17th century Elias Holl, of Augsburg (1573-1636), enjoyed great fame; he built the town-hall of that city in 1615-20. At the same time the town-hall of Nuremberg was erected by Holzschuher. More important constructions were undertaken in Germany toward the end of the 17th and the beginning of the 18th centuries. To the powerful buildings of this time belongs the Arsenal at Berlin (1685), as well as the portions of the royal palace built by Schlüter in 1699-1706. The chief buildings erected by Frederic II., King of Prussia, at Berlin and Potsdam, were built by von Knobelsdorff.

Rococo is not strictly an architectural but rather a decorative style. It consists of a meaningless use of scroll and shell work, without organization or individuality. It is, by its nature, usually confined to interior ornamentation, in connection with mirrors, lustres, porcelain and Chinese and Japanese works of art. The style spread rapidly through Europe under Louis XIV. Germany possesses many examples of the style in the palace of Sans Souci, the Zwinger at Dresden, etc., as well as of the style which succeeded the Rococo, the Style Régence and Louis XV.

MODERN ARCHITECTURE.—A new period in the development of architecture begins about the close of the 18th century, when a reaction against the rococo style may be seen here and there in buildings, which by a simple and natural style formed a pleasing contrast to the mannered conventionality of the former. Important examples are the Mint in Berlin, built at the end of the 18th century by H. Gentz, and the Brandenburg Gate, by Langhans.

At the same time a second step in this new development is seen in those efforts which resulted from renewed and thorough study of the antique, by which the art again acquired a refined and purified style. Winckelmann (1717-68) led this movement, though his influence did not result in tangible form till the succeeding generation. Since Stuart and Revett the study of Greek monuments had been eagerly pursued, and the treasures of Greek architectural ornament were carried to the museums of Western Europe, and reproduced everywhere in plaster casts. This change from the florid style to pure classical forms resulted in France in the adoption of the Roman style; in England, in an exact reproduction of the Greek models; and elsewhere in an attempt to create something new in the Greek spirit. In the latter class Ger-

many offered fine examples in the works of K. Schinkel (1781-1841), which show purer appreciation of classic forms than any of modern times; also in the old Museum, the Doric garrison, and the theatre at Berlin. A development in another direction resulted from opposition to the one-sided and fixed conceptions to which the antique tendency often gave rise. This tendency was restricted, and soon passed, but not without beneficial results. An important revival of Gothic Architecture took place at this time, developing in England, where the limits between the Middle Ages and modern times are not as sharply defined as in other countries. In Germany many buildings were erected in Gothic style, showing partly a reproduction of its external features, with a tendency to classic forms, contradicting its fundamental principles, while a few German architects adhered to the Roman style. These various stages were followed by the present style, which was almost entirely confined to the reproduction of the forms of the Renaissance. Next to Berlin, Bavaria, and especially Munich under King Louis I., was the scene of great architectural activity in recent times. Here Leo von Klenze, in the Glyptothek (1816-1830), the Walhalla at Regensburg, the Befreiungshalle at Kelheim, the Ruhmeshalle and Propylæum at Munich, held closely to the principles of the antique with remarkable results, and in the Pinakothek and the new palace skillfully used the Renaissance; while Gärtner in the Ludwigskirche, the Library, and the University adhered to the Romanesque style; and Ziebland, in the basilica of St. Boniface, reproduced the early Christian, and Ohlmüller, in the Marienhilfskirche, in the suburb of Au, the Gothic.

King Maximilian II. in 1848 attempted to call forth a new style in place of reproductions from antiquity, and the Munich Academy of Fine Arts in 1851 awarded a prize to W. Stiers, of Berlin; but the execution of his plans was entrusted to Burklein, who had showed his skill in reproducing the Roman style, but who failed to create anything satisfactory in the new Maximilianstrasse and its public buildings, or in the government buildings and the Maximilianeum. Among recent buildings in Munich are Haubrisser's Gothic town-hall, and Neureuther's new Polytechnic in Renaissance style. In the buildings of the Baden railroad, Eisenlohr adapted the Roman style to present conditions, and Hübsch showed his best work in developing early Christian and Roman architecture in the theatre at Carlsruhe, the Trinkhalle at Baden-Baden, and above all in the art-school at Carlsruhe. The Stuttgart school, by a free adaptation of antique forms, led to a noble Renaissance, of which Lein's villa at Berg, Egles' Polytechnic, and the residences of Stuttgart are fine examples. The development of architecture in Vienna dates from 1828, which Müller, a pupil of Ziebland, gave a fresh impulse in Alsterchenfelder church in modified Roman form, followed by the immense Arsenal after the combined plans of Hansen, Förster, Rösner, and Siccardsburg. Hansen's chief works in Vienna are the Renaissance palace of the Archduke Wilhelm, the Parliament buildings in Greek style, and the Academy of Fine Arts. Von Siccardsburg and Van der Nüll erected the new Opera-house in Late-Renaissance and Förstel produced a noble Gothic specimen in the Votivkirche, and imposing Florentine in the banks and exchanges, and the University. Friedr. Schmidt stands at the head of the strict Gothic school, with his Lazaristenkirche, the Gymnasium, and Town-Hall in Italian-Gothic. The erection of the Royal Museum, the Royal Theatre and palace after designs by Von Semper and Hasenauer forms a noble conclusion to a group of buildings unsurpassed in any other modern capital. In North Germany the principal specimens of modern architecture are the Friedenskirche at Potsdam, by Persius, the Jacobikirche in Berlin, by Stüler. Among the secular buildings with which Frederick William IV. adorned Berlin are Stüler's new Museum and the National Gallery, by Strack, the elegant hotel of the Russian Embassy, by Knoblauch, the Town-hall, by Wisemann, the Exchange in Renaissance style, the first stone building erected in Berlin, and the Imperial Bank by Hitzig.

The chief architectural works of Dresden are Semper's Theatre and the Museum. From Cologne, where it was fostered by the completion of the cathedral under Zwirner's direction, Gothic architecture has spread over Germany and produced many fine examples.

France ranks next to Germany in recent architecture, Paris being the centre of all production. The strictly antique tendency of Percier and Fontaine under the First Empire was followed by the free classical tendency of Hittorf of Cologne, who built the noble basilica of St. Vincent de Paul, and completed the laying out of the Place de la Concorde. Examples of Gothic, chiefly in its earliest forms, are Viollet le Duc's church of St. Denis and the Church of St. Clotilde by Gau, from Cologne, and by the former also the restoration of the Sainte Chapelle. The influence of the Renaissance is shown in the restoration and enlargement of the Hôtel de Ville, by Ballu and Deperthes, and in Duban's splendid creation, the École des Beaux-Arts. Visconti followed the same tendency in his fountains of St. Sulpice, and Molière, and the Imperial tomb under the dome of the Invalides. Public as well as private buildings in the new quarters show an increasing tendency toward Late-Renaissance, as in Garnier's Grand Opera, and in some recent churches. An attempt to combine the elements of Roman, Moorish, and Renaissance styles is shown in the Trocadéro palace, erected for the Exposition of 1877 by Davidov and Bourdais.

In England archaeological researches carried on from the beginning of the century

have led to a pure and undeviating devotion to classic forms. Later a change was made to Late-renaissance in the Royal Buildings, and Gothic, chiefly in its latest forms, is much used—for example, in Barry's Houses of Parliament. The possibilities of construction of iron and glass are seen in Paxton's Crystal Palace at Sydenham.

AMERICAN ARCHITECTURE.—The age and conditions of our American civilization do not admit of an indigenous architectural development, as in older countries, and therefore we find in America examples of every known national style, imported originally by the early colonists of the country, and of late years made more general by the diffusion of photographs and the increased knowledge of European architectures brought about by the rapid growth of foreign travel. The building operations of the settlers of the seventeenth century were modeled upon those of the countries from which they had emigrated. Thus the early buildings of New England and Virginia are essentially English; those of New York and Pennsylvania are Dutch and German, while Florida shows thoroughly Spanish architecture, and New Orleans is a transplanted French city. These national styles were modified only by the changed needs, and especially by the poverty of the colonists, which necessitated the use of perishable material and hasty construction. The earliest buildings, therefore, soon passed away; and not for some generations were more ambitious and enduring works undertaken. With the beginning of the eighteenth century the increased intercourse between the individual colonies gave rise to a more homogeneous and English architecture. The more important buildings of the period are all the works of English architects, e.g., King's Chapel, Boston (1749), by Harrison, and St. Michael's, Charleston, S. C. (1752), by Gibson, a pupil of Wren. To the same period belong Christ Church, Philadelphia, and the old State-Houses of Boston and Philadelphia. The colonial dwelling-houses of the Colonial period were simple in style and usually of wood, depending for their external effect chiefly upon the use of columns, and with interiors of great plainness, all the ornamentation being concentrated in the staircases, of which some very valuable and artistic examples still exist. The rise of the new nation after the Revolution necessitated government buildings, of which the first and chief was the Capitol at Washington. The corner-stone was laid by Washington in 1793, and the building went on under various architects—Hallet, Hadfield, Latrobe, and Bulfinch, under the last of whom the original Capitol was completed in 1827 at a cost of \$2,500,000. In time the growth of the country necessitated extension of the building, and the work was carried out by Thomas Walter, 1851-1867. In its present form the Capitol is a monumental edifice, with a dome 135 feet in diameter, rising 217 feet above the roof. The architectural effect is secured by the free use of porticoes and colonnades, and by the striking approaches. The other older Government buildings were of a similar style. Since that time a style founded on the Italian Renaissance has been employed in nearly all public buildings, sometimes with great success. To this period belongs the New York City Hall (1803-1812), built of marble and freestone, which at the time of its erection surpassed all buildings of its kind in material and conception. The church architecture of the period was exceedingly plain, the chief feature being the steeples, of which many fine examples exist. For a time Greek architecture became the fashion, and was applied to buildings irrespective of their uses. To this development belong the custom-houses at Philadelphia, New York (with monolithic columns), and Boston, and the main building of Girard College, Philadelphia. The same style reached the height of absurdity when applied to small private dwellings of wood. The first successful attempt in Gothic architecture was the erection (1839-1845) of Trinity Church, New York, by Richard Upjohn, which has since remained the accepted type of American church buildings. From the church the Gothic style was for a time carried over to all other classes of buildings, but was soon abandoned. With the rapid growth in wealth and ambition there succeeded crazes for various architectural styles, in the use of which artistic ignorance joined with disregard for utility. Egyptian, Moorish, Swiss, and many other types were employed, and some unfortunately perpetuated in New York and other of our larger cities. All these fashions in time were abandoned, and now appear only in rare instances. For a time iron became a favorite building material, and hundreds of business buildings were erected with cast-iron façades of all architectural types, until it was shown that the initial cheapness of the material was more than counterbalanced by the expense in repairs, when the style followed its predecessors. A revival of Gothic architecture, under the influence of Ruskin, produced some buildings of real merit—among them the building of the National Academy of Design, in New York, largely in the Venetian style; the elaborate State Capitol of Connecticut at Hartford, and the Harvard Alumni Memorial Hall at Cambridge.

Of late years, the prevailing style for municipal buildings has been that of the French Renaissance. Imposing examples of the style are seen in the new Municipal Buildings of Philadelphia and in the new buildings of the State and War Department at Washington. Many of the newer Capitol buildings of the various states are architecturally of merit; among these the most ambitious is the Capitol at Albany.

In church architecture, New York, Boston, Chicago, and some western cities possess many good examples of Gothic and other styles. The largest and most expensive church edifice on the continent is the recently completed Roman Catholic Cathedral in New York. A notable departure from the Gothic style is seen in Trinity Church, Boston, where the Romanesque has been employed with complete success.

In no other point has the American lack of architectural taste been so signally displayed as in the erection by thousands of so-called "Queen Anne" buildings. Even our larger cities have not escaped the bewildering conglomerations of gables, lattice-work, turrets, and tasteless and laborious ornamentation which most of these buildings display; but it is in the smaller towns and villages, and especially in the West, that the craze has run riot. Fortunately the construction of these buildings, mostly dwelling-houses, is of so flimsy a character that they will not endure long to offend good taste; and the private houses which are succeeding them show a reaction from their meretricious style. The former sameness and monotony in dwelling-houses which obtains in most of our older cities is giving place to a pleasing variety, especially in newer localities, which, if properly restrained, will soon entirely remodel the face of our cities. The change is due in great part to the formation of Schools of Architecture, which are beginning to provide us with thoroughly equipped native architects. Such are the schools connected with the Massachusetts Institute of Technology, Cornell University, and the School of Mines of Columbia College. The American Institute of Architects, founded in 1867, with its local branches, assists in encouraging professional intercourse among its members; and the various architectural journals spread an increasing knowledge of the art. All these agencies combine to form, if not a national type of architecture, at least a national educated taste, which will render impossible the crudities of past generations, and develop refinement in the choice or combination of styles already existing.

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ARCHITRAVE (Gr. *archi-*, chief; Lat. *trabs*, beam), the lowest part of the entablature (q.v.), or that which rests immediately upon the columns.

ARCHIVES. See **RECORDS**.

ARCHIVOLT, the ornamental band or molding which runs round the lower part of the voussours of an arch. Parker's *Glossary* states that when it is quite plain, with square edges, as in the Roman and Romanesque styles, and in the early Norman, as at the chapel of the White Tower of London, the term *soffit* is applicable to it. In later Norman work, however, it usually has the edges chamfered off or molded; and toward the end of that style, and throughout all the Gothic styles, it is frequently divided into several concentric portions.

ARCLUTE, a large double necked lute about four feet five inches long, used in the 17th century for the lowest part in instrumental music and accompaniments. The neck contained two sets of tuning-pegs, and the strings were of catgut, or metal, with a compass of two octaves from G below the bass clef. The sound-board, pierced with a circular ornamental hole, was of pine, while the back was made of strips of pine and cedar glued together and richly ornamented. See *Chitarrone*, *Lute*, and *Theorbo*.

ARCHULETA, a s.w. co. of Col., formed 1885 from the western part of Corregos; about 1100 sq.m.; pop. '90, 826. The eastern part is crossed by the San Juan mountains, and the western and more level portion is watered by the San Juan river and its branches. Co. seat, Pagosa Springs.

ARCHON, the highest magistrate in Athens. The government was originally monarchical; but on the death of Codrus (q.v.), the Athenians, according to the traditionary account, resolved that no one should succeed him with the title of king (*basileus*), and therefore appointed his son Medon with the title A. (ruler). The office was at first for life, and confined to the family of Medon; but in 752 B.C., the time of office was limited to ten years; and in 714, the exclusive claims of Medon's family to the office of A. were abrogated, and it was thrown open to all persons of noble birth; afterwards to all citizens, without distinction of rank (477 B.C.). In 683, the office had been made annual, and the number of archons had been extended to nine. The year was named from the first A.; to the second, styled Basileus, belonged the care of religious affairs; the third was Polemarchos, or commander-in-chief; and the remaining six, having to conduct all criminal trials, were styled thesmothetæ, or lawgivers.—Among the Jews, during the time of their subjection to the Romans, the title of A. had various meanings; but was generally given to the members of the sanhedrim or supreme council.—In the mystical jargon of the Gnostics, the term A. was frequently employed, and hence one of their sects, especially opposed to Judaism, received the name **ARCHONTICS**. See **GNOSTICS**, **HERESY**, **HERETICS**.

ARCH-PRIEST, a name dating from the fourth century, and equivalent to the Greek *protopresbyter*, was usually applied to a senior priest attached to a cathedral, whose duties were to assist the bishop, and to act as his substitute in the performance of the church offices. This title in later times gave way to that of *dean*.

ARCHYTAS of Amphis, a Greek poet, is supposed to have lived about B.C. 300. Only fragments of his work remain. Two lines in Stobæus, taken from the *Hermes* of Eratosthenes, are attributed to Archytas, and Plutarch inserts in one of his works a hexameter verse, on the country of the Ozolian Locrians, that was written by Archytas. Laërtius (viii. 82) speaks of an epigrammatist called Archytas, and the epic poem *Ἑρμῆος* was supposed by many of the ancients to be the work of Archytas and not, as others claimed, of his contemporary, Euphorion.

ARCHYTAS of Tarentum, one of the most illustrious men of antiquity, flourished about the year 400 B.C. His father's name was Mnesagoras. A. is said to have been a contemporary of Plato, and on one occasion to have saved the life of the latter when the tyrant Dionysius wished to put him to death. His public career was glorious. He was seven times elected general of his city, though it was customary for the office to be held only for one year; and in every campaign which he undertook, he was victorious. His civil administration was equally fortunate. Affairs of the highest moment were repeatedly intrusted to him; and yet, though deeply skilled in philosophy and politics, he was possessed of a childlike simplicity of character. He was drowned on the Apulian coast. A.'s virtues were as conspicuous as his talents. He paid the most humane attention to the comfort and education of his slaves, and although one of the greatest geometricians, he did not disdain to make a rattle for the amusement of his children. He solved the problem of the doubling of the cube, and secured almost the reputation of a magician by his numerous mechanical contrivances, the most wonderful of which was the flying pigeon. A Pythagorean in philosophy, he is generally supposed to have exerted a considerable influence on Plato, and some affirm that even the gigantic understanding of Aristotle was indebted to him for the idea of his categories. Only fragments of his writings remain. They relate to metaphysics, ethics, logic, and physics.

A work attributed to him: *On the 10 Categories* was published by Camerarius, under the title *Ἀρχύτου φερόμενοι δέκα λόγοι καθολικοί* (Lips. 1564; Ven. 1571); Gale in *Opusc. Mythol.* (Cambridge, 1671; Amst. 1688), gives several fragments of Archytas, and in 1820 Jos. Navarro began the publication of a full collection under the title *Tentamen de Archytæ Tarentini vita atque operibus*.

ARCIS-SUR-AUBE, a small t. in the French department of Aube, situated in lat. 48° 32' n., long. 4° 8' e., with about 3000 inhabitants, is remarkable on account of the battle fought here, Mar. 20, 21, 1814, between Napoleon and the allied forces under prince Schwartzenberg. The battle, beginning with several skirmishes on the first, and ending in a general engagement on the second day, when the French retreated over the Aube, was not in itself very important. But Napoleon now formed the plan of operating in the rear of the allies, and left the road to Paris open; assuming that they would not venture to proceed without attempting first to secure their rear. The allies marched, nevertheless, on the capital, and thus decided the campaign.

ARCOGRAPH (Lat. *arcus*, a bow, Gk. *graphein*, to write), an instrument for describing arcs of circles without the use of a central point, and is employed in cases where the compass cannot be used.

ARC LAMP or **ARC LIGHT SYSTEM**. See **ELECTRIC LIGHTING**.

ARCO LA, or **ARCO LÉ**, a village on the left bank of the Adige, in northern Italy, 15 m. e.s.e. of Verona, famous for the victory gained by Bonaparte over the Austrians, 17th Nov., 1796. The Austrians, relieved by the retreat of Moreau from the Rhine, had begun to take the offensive in Italy, and Gen. Alvinzy appeared at the head of 50,000 men, with the main body of which he advanced to Caldiero, and threatened Verona. Bonaparte, recognizing the danger, descended by night the course of the Adige, crossed that river at Ronco, and was thus in a position to threaten the left flank of Alvinzy's army, which was posted at A. A causeway leads from Ronco across the morasses to A., before reaching which, the road crosses the small stream of the Alpon by a narrow bridge. This bridge was defended by the Austrian general, Mittrowsky, with 14 battalions of infantry, and 2 squadrons of cavalry. On the 14th of Nov., Augereau attacked the bridge with two battalions of grenadiers, but being exposed in flank to the Austrian fire, was obliged to withdraw. Bonaparte now seized the standard himself, and rushed on the bridge, followed by the grenadiers; but again the fire of the Austrians, who were in much greater force than the French, made it necessary to draw back. The struggle was renewed on the 16th, with a similar result; and it was only on the 17th that the French succeeded in getting possession of A., not, however, by forcing the bridge, but by sending a column across the Alpon, lower down, and getting in rear of the Austrians. On this Alvinzy was obliged to retreat to Vicenza. It fared no better with the other column of the Austrians under Davidovich. In this series of battles the Austrians lost 18,000 men killed; the French, 15,000.

ARÇON, **JEAN CLAUDE D'**, a distinguished French engineer, b. at Pontarlier, 1733, was originally intended for the church, but on manifesting a decided preference for the study of Vauban, his father, an eminent juriconsult, consented to his choice of a military profession. In 1754, he entered the military school at Mézières, and, in the following year, he passed as an engineer. During the seven years' war, he acquired considerable reputation, especially in the defense of Cassel. His fertility of invention was surprising, and of the greatest benefit to that branch of the service with which he was connected. In all his writings—which, in spite of a very faulty style, can be read with pleasure—there are indications of a lively, rich, and vigorous genius. He was even bold enough to question the wisdom of certain strategical propositions of the great Frederick. But his most famous scheme was that by which he hoped to reduce Gibraltar, then in the hands of the English, and defended by Governor Elliot. He contrived floating batteries, incombustible, and not liable to sink, which, however, were not successful, though this is mainly to be attributed to the fact of his efforts being indifferently supported. When the French, under Dumouriez, overran Holland, A. took several strongly-fortified places, amongst others, Breda. After this, he retired from public life, and confined himself to the literature of his profession. His most important work is *Considérations Militaires et Politiques sur les Fortifications* (Paris, 1795). In 1799, Bonaparte called him to the senate, but he died the year after.

ARCOS DE LA FRONTE'RA, a t. on the right bank of the Guadalete, in Andalusia, Spain. Its principal manufacture is that of tanned leather, which was the first established in Andalusia; thread and ropes are also manufactured. Pop. 16,280. A. de la F. has a wild and romantic situation, which harmonizes well with the picturesque garb of the inhabitants, who still wear the old national costume. It was called Arcos, from being built in the form of a "bow;" and after Alfonso-el-Sabio had rescued it from the Moors, it received the additional name of *de la Frontera*, from its frontier position, being in the vicinity of the Moorish kingdom of Granada. Almost impregnable by nature, it was furthermore embattled with walls and towers, part of which still remain, and afford a magnificent view of the Ronda mountains.

ARCOT, a city of Hindostan, in the presidency of Madras, the capital of the district of north Arcot. It is situated on the right bank of the Palar, a river which, rising in Mysore, is, in the rainy season, about $\frac{1}{2}$ m. wide before the town. It stands in n. lat. 12° 54', and in e. long. 79° 24', and is distant from Madras 65 miles. Besides the military cantonment, which can accommodate 3 regiments of cavalry, A. contains some mosques in a tolerable state of repair, and the ruins of the Nawaab's palace. At the census of 1871, the t. of A. (more properly spelled *Arkát*) had a pop. of 10,988. A. is chiefly notice-

able for its history. It was the spot where Clive first firmly established his military reputation. With a force of 300 Sepoys, 200 Europeans, and 3 field-pieces, he marched against A., which was garrisoned by 1100 men; and after having taken it, he stood a siege of 50 days against thousands of assailants, amid hardships and privations of every description.

ARCOT, a portion of the presidency of Madras. It consists of 2 districts, the northern and the southern, of which the respective areas are 7139 sq. m., and 4873, and the respective populations, according to the census of 1891, 2,180,000 and 2,163,000, approximately.

As most of the rivers are destitute of water in the dry season, there are thousands of tanks in A. Some of them are of an enormous size: that of Cavery-pak, in particular, measures 8 m. by 3. These tanks are indispensable, as well for irrigation as for domestic use. The hot and parching winds from the w., sweeping down the valleys of the eastern ghats, are often fatal to birds on the wing, and also to human beings when exposed for any length of time. Glass cracks and flies in pieces; and wood shrinks, splits, and shivers; and from the mutual friction of the sapless trees, spontaneous combustion sometimes takes place in the jungles.

ARCTIC means, properly, lying near the constellation of the bear (Gr. *arctos*), and hence, northern. The arctic circle is a circle drawn round the north pole, at a distance from it equal to the obliquity of the ecliptic, or $23\frac{1}{2}^{\circ}$. The corresponding circle round the south pole is the *Antarctic* circle. Within each of these circles there is a period of the year when the sun does not set, and another when he is never seen, this period being longer the nearer to the pole.

ARCTIC CURRENT comes from the northern ocean down Davis's strait and also down the e. coast of Greenland, joins the Labrador current off cape Farewell, flows along the Newfoundland coast, and is lost in the gulf stream. Its water is very cold, and has the effect of lowering the temperature of the Labrador coast.

ARCTIC HIGHLANDS, a name sometimes applied, though not very appropriately, to that portion of the American continent which lies between Hudson's bay and the mouth of the Mackenzie. It has been the scene of all, or nearly all, the overland efforts in connection with the exploration of a n.w. passage, from Hearne's discovery of the Coppermine, down to the recent voyage of Anderson—the most prominent among the intermediate laborers having been Franklin, Richardson, Back, Dease, Simpson, and Rae.

ARCTIC OCEAN, that part of the universal sea which surrounds the north pole. Its single boundary, that towards the s., naturally divides itself into four sections—the northern shores respectively of the two continents, and the northern limits respectively of the two intercontinental oceans.

The A. O. meets the Pacific at Behring strait, in about 66° of n. lat., so that here the A. O. overlaps the arctic circle by about $30'$. On the side of the Atlantic, again, the common border seems to be equally independent of arbitrary definition, for Scoresby sound almost as definitely terminates the s.e. coast of Greenland as North Cape terminates the n.w. coast of Europe; so that, as both extremes are intersected by about the same parallel of 71° , the A. O. here falls short of the arctic circle by about $4\frac{1}{2}^{\circ}$.

In the old world, the A. O., if we include its gulfs, stretches s. of the arctic circle, in the White sea, fully 2° ; while at cape Severo, the most northerly point of Asia, in lat. $78^{\circ} 25' \text{ n.}$, it falls short of the same by $11^{\circ} 55'$. Lastly, within the range of the new world, the A. O., in its strict acceptance, is everywhere forced back within the arctic circle, about 5° at Point Barrow, about $7\frac{1}{2}^{\circ}$ on Barrow's strait, and about 3° at the strait of the Fury and Hecla.

The waters of the A. O., however, may conveniently be extended beyond these their strict limits. So far as the mere aspect of the map is concerned, Davis's strait, Baffin's bay, and Hudson's bay may be regarded as gulfs rather of the Atlantic than of the A. O. But if essential characteristics are permitted to outweigh mere position, they must be assigned rather to the A. O. than to the Atlantic. Besides being all fed by currents from the A. O., they are all hyperborean in temperature. Even the most southerly of the three illustrates this. While Hudson's straits present, in general, more ice than Davis's strait or Baffin's bay, Hudson's bay itself has been the scene of perhaps the two most abortive, if not most disastrous, of all modern attempts at northern discovery. On opposite sides of Southampton island, Lyons and Black were arrested by impenetrable packs, the one near the bay of God's Mercy, and the other off cape Comfort—the latter point being $1\frac{1}{2}^{\circ}$, and the former being twice as much, s. of the arctic circle. Reckoning, therefore, to the bottom of James's bay, as an arm of Hudson's, the arctic seas, thus appended to the A. O. proper, reach as far s. as the parallel of London.

Little as is yet known, at least accurately, of the A. O., its discovery and exploration have developed and tasked more skill and heroism than perhaps the exploration and discovery of all the rest of the world since the age of Columbus. Without anticipating what is to be said on this subject under the heads of NORTH-EAST AND NORTH-WEST PASSAGES and POLAR EXPEDITIONS, it may not be out of place here to state summarily the comparatively easy labors of the Russians while issuing, as it were, from their domestic rivers to survey their domestic shores. Early in the seventeenth century several expeditions were sent out by the Muscovy company to complete, if possible, the n. e. passage. In the eighteenth century the Russian government sent several expeditions for the same purpose. From the White Sea to the Obi four seasons were con-

sumed; from the Obi to the Yenesei, four seasons; from the Yenesei to the Lena, season after season was spent in both directions without success; from the Lena to the Kolyma, six seasons were occupied; from the Kolyma to the Pacific every effort was fruitless, though the Cossack Deshneff was known to have accomplished this part of the enterprise about a century before.

Arctic navigation, in fact, is beset by almost every imaginable difficulty and danger. In addition to the peculiar perils of ice in all possible states, the adventurer, often blinded by fogs and snows, has to face, generally without guide or sea-room, the storms, tides, and currents of comparatively unknown waters. If such be his three months of summer, what must be his nine months of winter! Take a general illustration from the personal experience of the most successful of all the arctic navigators. On the parallel of 73° , and under a temperature of 15° below zero of Fah., Capt. McClure spent the night of 30th Oct. 1851, on the ice, amid prowling bears, and that without food or ammunition—his only guide being a pocket-compass, which, however, the darkness, thickened by mist and drift, rendered useless. The gallant officer whiled away the time by sleeping three hours on “a famous bed of soft dry snow,” and by wandering 10 m., by the crow’s flight, over a surface so rugged as to endanger his limbs. It was at the close of a pedestrian expedition of nine days, on very short allowance of food and water, that the adventure took place; and it had been immediately occasioned by a generous desire of reaching the winter quarters by a nearer cut, so as to have “a warm meal ready for his men on their arrival.”

Notwithstanding the labors and researches of two centuries and a half, very little of this vast ocean has been even seen by man. To the n. of $83^{\circ} 30'$, in fact, the A. O., so far as authentic evidence goes, is a mere blank to geographers, for Parry, in 1827, barely reached lat. $82^{\circ} 45'$; Kane, in 1854, touched only $81^{\circ} 22'$; the *Polaris*, in 1871, reached only $82^{\circ} 16'$; in 1874, the Austro-Hungarian polar expedition just reached $82^{\circ} 5'$; the British expedition of 1875-6 could advance no further than $83^{\circ} 20'$; Lockwood, in 1882 (Greely Expedition), reached only $83^{\circ} 24'$. At all the intermediate points of longitude, the northern limit of geographical knowledge falls short, more or less at every point, of the parallel of 83° . Perhaps the actual average of such northern limit, even on the full tale of 360° of long., may not exceed lat. 75° , so as to leave absolutely unknown a circle of 30° of lat., or nearly 2100 miles in diameter—an area little inferior to that of Europe. This untrodden world, however, is not to be regarded as a continuous wilderness of ice. Parry, at his furthest point, found not an unbroken field, but separate floes; with more or less of open water between them—the mildness of the temperature being indicated by falls of rain; and Kane, again, at his furthest point, saw a free sea to the n., as far as the eye could reach, from a promontory 240 ft. high; while, to use his own words, “a gale from the n.e., of 54 hours in duration, brought a heavy swell from that quarter without disclosing any drift or other ice.” This is quite in keeping with the fact already noticed, that Hudson’s straits and bay are often more encumbered with pack than the waters of far higher latitudes. With regard to currents, Parry, during nearly the whole of his boat-sleigh expedition of 1827, found that his place by reckoning was considerably ahead of his place by observation, or, in other words, that his northward progress on the floes was neutralized more or less by the southward progress of the floes themselves, the existence of a current towards the s. being thus shown. McClure derived advantage from the current, whether advancing through open water or drifting along at the mercy of the pack. The experience of Weyprecht and Payer was different from that of any preceding navigators, since they found that they steadily drifted north. While McClure had the fortune to return with the news of the discovery of the n.w. passage, McClintock has shown that the discovery must have been anticipated by Sir John Franklin. Succeeding expeditions, of which a great number have been equipped by England, Germany, France, Sweden, America, Austria, and Denmark, have been mainly directed towards the north pole. The reports of the expedition of 1875-6 lead to the conclusion that the pole is surrounded by an inaccessible region of ice, to which has been given the name of the palæocrystic sea, or sea of ancient ice.

Of the more southerly portion of the A. O., the only section that is tolerably well known to a distance from the continent is that which washes the n.e. of America. It contains, under the collective name of polar archipelago, these islands, or parts of islands: Banks Land, Prince Albert Land, Wollaston Land, Victoria Land, Prince Patrick Island, Princess Royal Islands, Melville Island, Cornwallis Island, North Devon, Grinnell Land, North Lincoln, and various others. Off the coast of the old world, again, are Spitzbergen, Nova Zembla, New Siberia, Wrangel Land, King Charles Land, etc. The latest discovery, made by Weyprecht and Payer in 1873, is that of Franz-Joseph Land, an extensive and mountainous tract, lying about 200 m. due n. of Nova Zembla. Its s. coast is in about 80° n. lat., and it was seen to extend as far n. as 83° , occupying at least 15° of longitude. The chief straits are Lancaster sound, Barrow’s strait, Smith’s sound, strait of the Fury and Hecla, Wellington channel, Banks strait, etc. The chief rivers, all of them on the mainland, are the Obi, the Yenesei, and the Lena, of the first class; the Mackenzie, the Yana, the Indigirka, and the Kolyma, of the second; and many others of the third.

The principal production of the A. O. has been the whale. The whale-fisheries on the w. coast of Spitzbergen, and on both sides of Greenland, scarcely need to be mentioned. But

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It may not be generally known, that, according to official returns as quoted by Admiral Beechy, the Americans had, in two years, drawn more than \$8,000,000 from the whale-fishery of Behring strait alone.

On the side of east Siberia, however, the A. O. produces a more remarkable article of traffic. Here are found, in the greatest abundance, the bones of the mammoth. Spring after spring, the alluvial banks of the lakes and rivers, crumbling under the thaw, give up, as it were, their dead; while the islands lying off the Yana, and even the depths of the sea itself, literally teem with these mysterious memorials of antiquity.

The American half of the A. O., if it cannot boast of fossil ivory, presents something still more difficult perhaps to be explained. In lat. 74° 25', and lat. 76° 15' respectively, Capt. McClure and Lt. Mecham discovered large deposits of trees, apparently indigenous, of considerable size. Writing of Banks' Island, McClure has the following passage: "From the summit of these hills, which are 300 feet high, to their base, abundance of wood is to be found, and in many places layers of trees are visible, some protruding 12 or 14 ft., and so firm that several people may jump on them without their breaking: the largest trunk yet found measured 1 ft. 7 in. in diameter"—equivalent in girth to about 5 ft. Again, "I entered a ravine some miles inland, and found the n. side of it, for a depth of 40 ft., composed of one mass of wood. Some of it was petrified, the remainder very rotten, and worthless even for burning." Writing of Prince Patrick Island, Mecham has the following passage: "Discovered buried in the e. bank of the ravine, and protruding about 8 ft., a tree of considerable size. During the afternoon I found several others of a similar kind: circumference of first and second tree seen, 3 ft.; of another, 2 ft. 10 in. From the perfect state of the bark, and the distance of the trees from the sea, there can be but little doubt that they grew originally in this country."

ARCTIUM. See BURDOCK.

ARCTOMYS. See MARMOT.

ARCTURUS, the principal star in the constellation Bootes (the "herdsman"). A. is of the first magnitude, and one of the most conspicuous objects in the northern heavens. Its right ascension is 14 h. 10.2 m. and declination 19° 49' n.

ARCUEIL, a French village, about 4 m. s. of Paris; pop. about 6000. The place is celebrated as the residence of the chemist Berthollet, and also for the ruins of an aqueduct made by order of the Roman emperor Julian to convey water to his residence.

ARCUS SENILIS, a not very well chosen term for a change occurring in the cornea of the eye, in consequence of fatty degeneration of its marginal part. The term is objectionable, because the change usually commences before the advent of old age, and further, because the *arcus*, or arch, is usually converted into a complete circle by the time that the patient has reached the age of 60 or 70 years. The *arcus senilis* usually commences at or even before the age of 40 years, as an opaque whitish crescent, skirting either the upper or lower margin of the cornea; and from this commencement it extends along the edge, till it finally becomes a complete circle, which sometimes assumes a chalky whiteness, and gives to the eye a very peculiar appearance. On careful examination, it may be seen that a narrow interval of partially clear cornea always intervenes between the *arcus* and the opaque sclerotic. As far as the eye is concerned, the formation of this circle is of little importance, but it is of great diagnostic value to the physician if, as Mr. Canton and several late observers maintain, its presence indicates the coexistence of fatty degeneration of the heart.

ARCY, GROTTO OF, a remarkable cavern 12 m. e. from Auxerre, France. It is supposed to have been used in early times as a stone quarry, and possibly the material for the Auxerre cathedral was taken from it. One of its divisions is 400 yards long, 26 high, and 14 wide.

ARD, or **AIRD**, a Celtic root, meaning "height" (cf. Lat. *arduus*, high), which appears in many geographical names, especially in Ireland and Scotland.

AR'DAHAN, a village with a pop. of about 1000 in the portion of Turkish Armenia ceded in 1878 to Russia, 35 m. n. w. of Kars. Its position gives it strategic importance. Its fortress was dismantled by the Russians in the war of 1854-56; in 1878, the Berlin congress sanctioned the cession to Russia of A., which had been captured early in the war. On account of the severity of the climate, the houses of A. are mainly constructed underground.

AR'DEA. See HERON.

ARDEBIL', or **ARDABIL**, a t. in Persia, 38° 15' n., 48° 19' e., in a fertile plain, 40 m. from the Caspian sea, apparently built from the ruins of a former city. It is surrounded by a wall of mud, with towers and fortified bastions at the corners. Its sacred treasure is the tomb of Shah Ismael Sufi, founder of the Sufi dynasty of Persia. Nadir Shah was here crowned king after the great council of the empire in 1736. A. is an emporium of trade for Tiflis, Derbend, Boku, Ispahan, and Teheran. From remarkable salubrity of climate it has acquired the title of "abode of happiness."

ARDECHE, a department in the south of France, taking its name from the river A., a tributary of the Rhone, includes the most northern part of ancient Languedoc. Great-

est length from n. to s., 74 m.; greatest breadth, 44. Area, 2136 sq.m.; pop. '91, 371, 269. A. is almost wholly mountainous. In the northwest of the department, the Cevennes culminate in the volcanic mont Mezène, 5973 ft. in height. The variety of the numerous extinct volcanic peaks, deep craters, rugged valleys, masses of tufa, grottoes, rock-labyrinths, ranges of basaltic columns, gigantic dams, etc., give a most extraordinarily picturesque appearance to the scenery. The upland, which has winter for six or eight months, is devoted to pasturage; but the terraces and valleys near the Rhone enjoy a warm climate, and produce good wine (white and red), olives, figs, almonds, chestnuts, etc. There are manufactures of silk, paper, leather, iron, etc.; and good roads, with water-carriage, facilitate commerce. Lead, iron, copper, manganese, etc., are wrought. The chief towns are Privas, Aubenas, Bourg, St. Andréol.

ARDEE', a t. in the west of Louth co., Ireland, on the river Dee, 12 m. inland. It contains two ancient castles — one built about the year 1200, and now used as the town-house; the other a square building, and now used as a prison. The chief trade is in corn and other agricultural products. The pop. in '81 amounted to 2622; in '91 to less than 2500.

ARDENNES, the western division of the slate-plateau of the lower Rhine. It extends over portions of Belgium, France, and Rhenish Prussia, and consists of a broken mass of hills, for the most part of no great elevation, which gradually slope towards the plains of Flanders. In early times, the name was given to the whole of the region lying between the Rhine and the Sambre, a length of about 160 miles. The average height of the hills is less than 2000 ft.; but in the east, mont St. Hubert attains an elevation of 2300 feet. Large tracts of this region consist not of hills, but of gently undulating plateaus, which are densely covered with oak and beech forests, while other portions are marshy, heathy, and barren. The districts through which the Meuse and other rivers flow, present some extraordinary appearances. The channel of the river is sometimes bound in by rugged and precipitous cliffs more than 600 ft. high. The principal rocks of the A. are clay-slate, grauwacke, quartz, etc., interspersed with extensive strata of primitive limestone. Coal and iron mines are wrought in the northwest; lead, antimony, and manganese are also found. There is little cultivation of grain, but multitudes of cattle and sheep are reared.

ARDENNES, a frontier department in the northeast of France, bordering upon the provinces of Namur and Luxembourg in Belgium. It formed a part of the old province of Champagne. Length, from n. to s., 63 m.; breadth, from e. to w., 60; area, 2020 sq.m.; pop. '96, 318,865. The northeast of A. belongs to the basin of the Meuse; the southwest is watered by the Aisne; both of these rivers are enriched with affluents, and united by the *Canal of A.* About one eighth of the whole surface is hilly, and covered with forests and wide tracts of pasturage. In the north extremity of the department, near Givet, marble is obtained; but the prevailing rock is limestone, veined with lead and iron. South of this, and stretching across the department, from e. to w., are great layers of slate, with here and there flint, quartz, etc. In the southeast, muschelkalk, rich in iron-ore, abounds; and in the southwest the soil is composed of arid chalk, a naked, treeless, elevated plain. Only the valleys are fertile, and produce corn. The vine is only cultivated at Mézières, in the southwest. Slate, marble, and iron, porcelain-clay, and sand for making glass are obtained. Excellent work-horses and sheep are reared. There are manufactures of earthenware, glass, marble, woolen cloths, metallic wares, etc. The principal towns are Mézières, Rethel, Rocroy, Vouziers, and Sedan, where Napoleon III. surrendered to the Prussians, Sept. 2, 1870.

ARDITI, LUIGI, b. Crescentino, Piedmont, Italy, 1822; educated as a violinist in the conservatoire at Milan; has filled the post of musical director in various places in Italy, Russia, Austria, America, and in London, and has composed three operas and a vocal waltz, *Il Bacio*, besides numerous songs, etc., and was the first to popularize Wagner in London.

ARDNAMURCHAN POINT, the n.w. promontory of Argyleshire, and the extreme western point of the mainland of Britain. A light-house was erected here in 1849, which is visible at a distance of 20 miles.

ARDOCH, a small village in Scotland, co. of Perth, 8 m. s.s.w. of Crieff, celebrated for a Roman camp, the most entire now in Britain. The camp is 2½ m. n. of the Green. loaning station of the Caledonian railway, in the grounds of A. house. The intrenched works form a rectangle 500 by 430 ft., the four sides facing the cardinal points. The n. and e. sides are protected by five ditches and six ramparts, these works being 270 ft. broad on the n. side, and 180 ft. on the e. A deep morass exists on the s.e., and the perpendicular banks of Knaig Water, rising 50 ft. high, protect the camp on the w. The prætorium or general's quarter, now called Chapel Hill, rises above the level of the camp, but is not exactly in the center, and is nearly a square of 60 ft. each side. Three of the four gates usual in Roman camps are still seen. A subterranean passage is said to have formerly extended from the prætorium under the bed of the Knaig. Not far n. of this station, on the way to Crieff, may be traced three temporary Roman camps of different sizes. Portions of the ramparts of these camps still exist. A mile w. of A. there was an immense cairn of stones 182 ft. long, 45 ft. broad at the base, and 30 ft. in sloping height. A human skeleton, 7 ft. long, in a stone coffin, was found in it.

ARDOYE, a t. in Belgium, in the province of West Flanders, 17 m. s. from Bruges. Linen-bleaching is the principal branch of industry. Brewing and candle-making are also carried on. Pop. (including the commune, which is not large) 6100.

ARDROSSAN, a small seaport t. and summer bathing-place in Ayrshire. It owes its rise to the public spirit of the Eglintoun family. Its harbor, which is sheltered by an island off the coast, is one of the safest and most accessible on the w. coast of Scotland, and has been greatly improved, at vast expense, by the earls of Eglintoun. There is a large export of coal from this place, and shipbuilding is carried on to a considerable extent. On a hill above the t. stand the ruins of A. castle, said to have been surprised by Wallace when held by the forces of Edward I. Pop. 5294.

ARE, the unit of the French land-measure, is a square, the side of which is 10 meters (or 32·809 ft.) long (see **METER**), and which, therefore, contains 100 sq. meters = 1076 English sq. ft. The next denomination in the ascending scale is the *decare*, containing 10 ares; but the denomination commonly used in describing a quantity of land is the *hectare* of 100 ares, = 2·47 English statute or imperial acres.

AREA (Lat.) is a term in mathematics meaning *quantity of surface*. The calculation of areas, or mensuration of surfaces, is one of the ultimate objects of geometry. The measuring unit is a square inch, a square foot, etc., according to the unit of length. As a figure is thus measured by finding an equivalent for its surface in *squares*, the process is sometimes called the *quadrature* of the figure.

ARECA, a genus of palms, containing several species, having pinnate leaves and double spathes. The fruit is a fibrous one-seeded drupe, a nut with an outer fibrous husk. *A. catechu*, the **PINANG PALM**, or betel-nut palm, is a native of the East Indies, whose nut yields a sort of catechu. See **CATECHU**. This areca-nut, or betel-nut, is very much used in all parts of the east, the chewing of it with quick-lime and the leaf of the betel-pepper being one of the most prevalent habits of the people. See **BETEL**. The nut is about the size of a hen's egg; the fibrous husk about half an inch thick. It is austere and astringent. It is doubtful if it possesses a narcotic power, or if this is to be ascribed entirely to the leaf which is used along with it. Areca-nuts form a considerable article of trade in the east. The timber of the palm which produces them, and its leaf-stalks and spathes, are also used for domestic purposes. The tree is often 40 or 50 ft. high, and in general less than a foot in diameter. The leaves are few, but very large, their leaflets more than a yard long. In Malabar, an inebriating lozenge is prepared from the sap. —*A. oleracea*, the **CABBAGE PALM** of the West Indies, is a very tall tree, 100 to 200 ft., whose huge terminal leaf-bud is sweet and nutritious, and is sometimes used for the table as cabbage, but when it is cut off, the tree is destroyed. The stem of this tree, notwithstanding its great height is remarkably slender. The nuts are produced in great numbers; they are about the size of a filbert, and have a sweet kernel. —*A. sapida*, the New Zealand palm, is remarkable as extending southward beyond the geographical limits of any other of its order, as far indeed as lat. 38° 22' s. It is a small palm, only from 6 to 10 ft. high, with leaves 4 to 6 ft. long. The young inflorescence is eaten. —*A. vestiaria*, a native of the east, is so called because clothing is made from its fibers. See **ILLUS.**, **PALMS**, **ETC.**, vol. XI.

ARECIBO, a t. of Puerto Rico, Spanish West Indies, on the n. coast of the island. It is the chief t. of a province of the same name. Pop. 11,000.

AREIOPAGUS (Gr. for "Mars' hill"), a mount lying to the w. of the acropolis, at Athens, and celebrated as the spot where the most venerable court of justice in ancient times held its sittings. It is not easy to determine satisfactorily why the hill obtained its name; most probably it was on account of sacrifices having been offered there at an early period to the god of war; but all its historic importance is derived from the Areiopagitic council, the origin of which reaches far back into antiquity, and is ascribed by some to the semi-mythological Cecrops. Orestes, according to tradition, was tried before this court, and it is certain that it must have existed long before the first Messenian war (740 B.C.), for the Messenians, in offering to submit to its decisions certain points of dispute, speak of it, even then, as "old." Solon, however, made many changes in its constitution, enlarging its sphere of jurisdiction to such an extent that it ceased to be any longer a mere criminal court, and acquired henceforth social and political powers in addition to the former. Before Solon's time it was strictly oligarchical. It now became a *tertium quid* between aristocracy and democracy, the new qualification for office introduced by Solon being *property* instead of *birth*. It thus naturally allied itself with aristocracy, so that we can perfectly understand why it should have been considered a check upon the impetuous democracy, though it would, perhaps, be fairer to regard it as a check upon both extremes. It is not known how many members were included in its council. The nine archons—if they had recommended themselves by a faithful discharge of their duties—were elected life-members of it. Solon made the council "overseers of everything," and we find instances of their manifold authority in the subsequent history of Greece. They granted money, at the time of the Persian invasion, from a reserve treasury of their own, the ordinary public treasury being empty. After the battle of Chæroneia, they executed all who had deserted their country. In social mat-

ters, their powers appear to have been curiously minute. They had officers whom they sent or accompanied into private houses, on occasion of a festivity, to see that the rooms were not overcrowded; they called to account persons who lived in such riotous extravagance that their example might be considered hurtful to the community, and conferred marks of honor on those of an opposite character. Their sphere of influence seems to have extended itself to religion also. Innovations in the worship of the gods, neglect of the sacred ceremonies, impiety in any form, brought the offenders under the rebuke and punishment of the A. It is likewise asserted that they possessed and exercised great authority in the education of the young, although this statement, and that regarding some charitable functions attributed to them, are of dubious value.

Until the time of Pericles, the brilliant and powerful ruler of the democracy, the A. continued to maintain its ancient dignity. He soon discovered, however, that it would prove an insurmountable obstacle to the realization of his designs if not shorn of its privileges. After much and vigorous opposition, he succeeded in carrying a decree (458 B.C.), by which, as Aristotle says, the A. was "mutilated," and democratic tribunals acquired supreme authority. It is, however, far from being clear what were the precise changes which Pericles effected, whether he abridged its powers as a criminal, or as a social and political court. From the high estimation in which it was held for centuries after, in the first of these capacities, we are inclined to think that it was its social and political supremacy that was destroyed. Probably the A. was made responsible to the demos, or body of citizens. It lingered in life for a very long period. We hear of it as late as 380 A.D., and it would seem, from the case of St. Paul, that it possessed in his day a certain authority in religious matters.

ARENNA, a part of an amphitheater (so called because it was usually strewn with sand, though when a fit of extravagance seized the Roman emperors, they used borax and cinnabar instead), where the combats of gladiators and wild beasts took place. It had four main entrances, and was surrounded by a wall about 15 ft. high, so that the spectators were perfectly safe. The name was afterwards applied by the Romans to any building for exhibitions of baiting animals, horsemanship, etc. On the continent, the name has been given to the large summer theaters for dramatic performances in the open air. It is applied also, in a general sense, to any scene of contest or display of power.

ARENAC, an eastern county of Michigan, on Saginaw bay, organized 1883; 388 sq. m. It is watered by Rifle river and other streams. Pop. '90, 5683. Co. seat, Standish.

ARENA'CEOUS ROCKS. All rocks composed entirely, or to a large extent, of grains of siliceous, are included under this title. Beds of loose sand occur extensively in the more recent deposits. The grains, either of quartz or flint, are generally water-worn and rounded. In older deposits, the grains of sand are bound together by silicious, calcareous, argillaceous, or ferruginous cements. It is seldom that a rock is composed of quartz materials alone; grains or particles of other mineral substances are frequently mingled with the grains of quartz. Silvery flakes of mica are seldom absent; and they often occur in layers parallel to the planes of stratification, causing the rock to split into thin slabs, and exposing a glittering surface. These are called *micaceous sandstones*. When grains of feldspar occur, it is a *feldspathic sandstone*. Often large quantities of calcareous matter, either as cement or as distinct grains, occur; and these are called *calcareous sandstones*. The presence of lime can always be detected by the effervescence which takes place on the application of muriatic or other acid. When the sandstone is coarse-grained, it is usually called *grit*. If the grains are large enough to be called pebbles, it becomes *conglomerate* or *puddingstone*; if the fragments are sharp and angular, it is called *breccia*.

ARENA'RIA, or **SANDWORT**, a genus of plants of the natural order *caryophyllæ*, differing from *stellaria* (stitchwort, q.v.) chiefly in the undivided petals. The species are numerous, annual and perennial herbaceous plants of humble growth, rarely somewhat shrubby, natives of the temperate and colder parts of the world. Some of them are arctic and alpine plants. Many of them are chiefly found in sandy soils. The flowers are generally small and inconspicuous, but if closely examined, are seen to possess no little beauty. See *illus.*, BOTANY, vol. II.

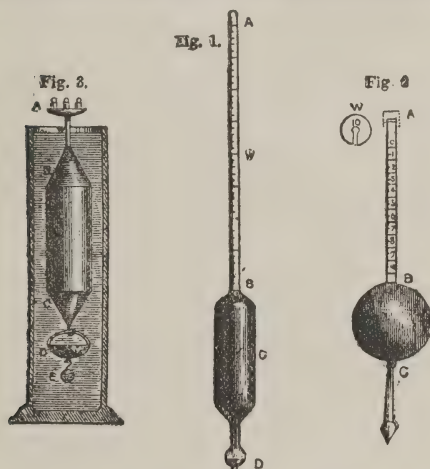
ARENDAL, a t. on the s.e. coast of Norway, situated near the mouth of the Nid-elf in the bay of Christiania. Pop. less than 5000. It is built partly on poles, partly on rock, and this circumstance, as well as its situation, gives it a very romantic aspect. The bay, which is protected by the island of Tromø, forms an excellent harbor, and favors the commerce of the town, which is considerable, in proportion to its size. A. is intersected by canals; its exports are iron from the neighboring mines, and wooden articles. Ship-building is also carried on; and on a smaller scale, distilleries and tobacco factories.

ARENG' or **ARENGA**. See **GOMUTO PALM**.

ARENIC'OLA. See **ANNELIDA**.

AREOMETER (*araios*, thin, and *metreō*, I measure; Fr. *aréomètre* or *pèse-liqueur*; Ger. *Aräometer* or *Senkwaage*), called also hydrometer, an instrument which is allowed to float freely in liquids, to determine their specific gravity or that of solid bodies. By specific gravity (q.v.) is meant the ratio that the weight of any volume of a substance bears to the weight of the same volume of water. Thus, a cubic foot of alcohol weighs 793

ozs., while the same quantity of water weighs 1000 ozs.; the specific gravity of alcohol is set down, therefore, as $\frac{793}{1000}$ or .793. A cubic foot of sulphuric acid weighs 1841 ozs., and has, consequently, a specific gravity of 1.841. These relations are not confined to the particular volume, one cubic foot, of these bodies, but hold for any equal volumes of them. Equal volumes of alcohol, water, and sulphuric acid, have always to each other the ratio respectively of 793, 1000, and 1841; and this is only an instance of the general principle, that equal volumes of different substances have weights bearing to each other the direct ratio of the specific gravities of these substances. This is the principle on which areometers with weights, or weight-areometers, are constructed. If, however, equal weights of any two of these liquids were taken, it would be found that .793 of a cubic foot of water would weigh as much as 1.000 cubic foot of alcohol; 1.000 cubic foot of sulphuric acid as much as 1.841 cubic ft. of water; or .793 of a cubic foot of sulphuric acid as much as 1.841 cubic ft. of alcohol; more generally thus—when equal weights of two different fluids are taken, the volumes of each are inversely as their specific gravities. On this latter principle depends the use of areometers with scales, or scale-areometers. The scale-A. is much more commonly employed than the weight-A., and is, in consequence, a much more important instrument. Of the various forms of scale-areometers, that contrived by Gay-Lussac deserves particular notice, from the simplicity of the mode of graduation; and an account of it will give the best idea of the general nature of such instruments. Fig. 1 gives a representation of it. It consists of a uniform glass tube, AB, blown into two bulbs C and D, at the bottom. The lower bulb, D, is loaded with mercury, so that when the instrument floats in any liquid, the stem, AB, is maintained in a vertical position. We shall suppose that the quantity of mercury is so adjusted that when placed in water, the A. sinks to the point W, which may, in consequence, be called the water-point. According to the principle of Archimedes, the weight of the volume of water displaced by the instrument up to this point is equal to the weight of the instrument. Let us suppose, for the sake of simplicity, that the water so displaced is a cubic inch, the weight of the A. will be that of a cubic inch of water, or 250 grains (more correctly 252.5 grains at 60° F.). If the A. be now placed in a fluid heavier than water, such as a mixture of sulphuric



Areometers.

acid and water, having a specific gravity $\frac{5}{4}$ or 1.25, it is manifest that if it is sunk again to the water-point, the displaced fluid would weigh $\frac{5}{4}$ of 250 = 312½ grains, or 62½ grains more than the weight of the instrument. As much, therefore, of the stem of the A. must rise above the liquid as will reduce the weight of the displaced liquid to 250 grains, or reduce the volume to $\frac{4}{5}$ of what it was before. If the stem in this case rises to B, the volume displaced by the part WB is $\frac{1}{5}$ of the volume displaced by the instrument at the water-point. If we consider the whole divided into 100 parts, and mark 100 at W, B must be marked 80, as the A. displaces up to that point $\frac{4}{5}$ of 100; and if the intervening space on the stem be divided into 20 equal parts, each of them will correspond with $\frac{1}{100}$ of the water-volume—viz., .01 of a cubic inch, or with $\frac{1}{100}$ of the weight of the instrument—viz., 2.5 grains. If the same scale be carried above the point W. and the divisions marked as ascending from 100, the A. will be serviceable likewise for fluids less dense than water, and will mark the volumes which it displaces in each of them. The A. thus graduated gives immediately the volumes which it displaces in different liquids; and from these, seeing that it displaces in every case a weight of liquid equal to its own, the specific gravities may be calculated according to the principle already stated—viz., that equal weights of two different fluids have volumes inversely as their specific gravities. If, in a mixture of sulphuric acid and water, the A. stands at 90, according to the above principle, 90 volumes of the mixture weigh as much as 100 of water; therefore, its specific gravity is $\frac{100}{90}$ or $1\frac{1}{9}$. If, again, in a mixture of spirits and water, it should stand at 110, 110 volumes of the mixture weigh as much as 100 of water, so that its specific gravity is $\frac{100}{110}$, or $\frac{10}{11}$. In all cases, then, 100 is to be divided by the number read on the A., to determine the specific gravity of the liquid in which it floats.

The delicacy of the A. depends on the distance of the divisions on the scale, or on the thinness of the stem compared with the bulbs. An instrument possessing this advantage cannot be made to serve both for liquids heavier and lighter than water, for the stem would be of an inconvenient length; and it is usual to construct two areometers—

one marked with the water-point at the top, and the scale descending to 50, for fluids heavier than water; and the other, with the water-point at the bottom, and the scale ascending to 150 for fluids lighter than water. The scale is generally marked on a slip of paper, which is fixed inside the stem. Gay-Lussac's A. is also known under the name of "volumometer." Although it cannot be surpassed either for accuracy or simplicity, it is much less used than other instruments of a similar nature furnished with arbitrary scales requiring the aid of tables to interpret the readings. The best known of these is Twaddle's A., used in England; and Beaumé's A., extensively adopted on the continent. The A. with an equally-divided scale is a very ancient instrument; it was known among the Greeks under the name of "baryllion." On some areometers the divisions are not at equal distances, but are so drawn as to give at once, without table or calculation, the specific gravity of the fluid in which they are placed. Although very desirable, in practice they do not possess the accuracy of the A. with equally-divided scales, because the graduation of them is attended with considerable difficulty.

No form of A. can be made to determine specific gravities with perfect accuracy, and such instruments are only useful where a ready and good approximation is all that is needed. They are, in consequence, employed chiefly to ascertain the specific gravity of the various liquors and solutions which occur in the arts and manufactures, and very frequently they are graduated with reference to special liquids, as spirits, wine, milk, brine, etc. The alcoholometer or hydrometer of Sikes is an instrument of this latter description, and is in general use in the excise for estimating the strength of spirits. It is represented in Fig. 2. BC is a hollow brass ball, surmounted by a flat stem AB, and loaded below by a short conical stem CD, terminated by the pear-shaped bulb D. It is accompanied by eight weights, by which the weight of the instrument may be increased, and the range of the scale extended to fluids heavier as well as lighter than water. One of these weights, W, is shown in the figure; it is furnished with a slit, so as to allow of it being slipped on to the narrowest part C, of the lower stem. The stem, AB, is graduated into 11 equal parts, and these again into halves; and the instrument is so adjusted that its indications give the volumes of water that must be added to or taken from 100 volumes of the mixture under examination to reduce it to proof-spirit (see ALCOHOL), which is a mixture of nearly equal parts of water and alcohol. Thus, if the A. indicates 11 over-proof, 11 volumes of water must be added in order to bring the liquid down to proof-strength; and 100 gallons of such strength would be reckoned as 111; 100 gallons, at 11 under-proof, would in the same way be charged as 89. Very carefully-constructed tables accompany the instrument, in which the specific gravity and percentage of alcohol of different mixtures, at different temperatures, are marked, corresponding to each degree of the A. Since the specific gravity of alcohol is known, it might be thought that if that of a mixture of it with water were known, the relative proportions of each would also be known. Such, however, is not the case, for alcohol and water possess a chemical affinity for each other, which causes the combined volumes of the two to measure less than the two volumes separately. Thus, 50 volumes of alcohol mixed with 50 volumes of water does not make 100 volumes of the mixture, but only 96, and thereby the specific gravity of the mixture is higher than it would have been if no contraction had taken place. As the law of this contraction is very complicated, the relative proportions of the two in a combination of given specific gravity are only to be estimated from tables founded upon experimental data.

The peculiar feature of areometers with weights is, that instead of a scale, they have only one mark on the stem, to which the A. is in all cases sunk. One of the best-known instruments of this kind is the A. of Nicholson. It consists of a brass tube, BC (fig. 3), about 1 in. in diameter, closed above and below by conical ends, to the upper of which a wire is fixed, carrying on the top of it a cup A, capable of containing the weights; and to the lower a hook is attached, from which hangs the cup D. The lower part of the cup, D, is also provided with a hook, and the whole instrument is kept vertical, partly by the weight of the cup, and partly by the weight of the ball, E, suspended from it. On the wire, a notch, W, is made, to serve as the mark or fixed point to which the A. is sunk. The specific gravities of liquids are determined by Nicholson's A. in the following way: The weight of the A. itself is first ascertained—let it be in a given case 2000 grains—it is then put into water at the temperature of 60° F., and weights (say 500 grains) put in, till it is sunk to W. It is now removed to the liquid under examination; and if the weight required to sink the instrument now to the standard-point be only 100 grains, we have the specific gravity of the liquid equal to $\frac{2100}{2000}$, or $\frac{21}{20}$. In both fluids the same volume has been displaced, and that is in each case equal to the weight of the A.; but the weight of the A. in the second case was 2000 + 100, and in the former, 2000 + 500; hence the above result. Nicholson's A. is seldom used for finding the specific gravity of fluids; its use is almost entirely restricted to ascertaining that of small solid substances, as gems and small pieces of minerals. The following example will show how this is done: If in the cup of the A. already mentioned, when placed in water, the gem be put, and only 440 grains be then necessary to bring the instrument to W, 60 grains is manifestly the weight of the gem, because 500 grains were needed without it to do the same thing. The gem is next placed in the lower cup, D, and if 460 grains are now needed to sink to the standard-

point, the gem has thus lost 20 grains of its weight by being immersed in the water. According to the principle of Archimedes (q. v.), these 20 grains are also the weight of a volume of water equal to that of the gem; so the specific gravity of the gem is $\frac{20}{30}$, or $\frac{2}{3}$. By reversing the cup D, which is furnished with perforations to allow free passage to the air, and attaching the weight, E, to the handle of it, the specific gravity of substances lighter than water may also be determined by this instrument. The other forms of weight-areometers are those of Fahrenheit, Tralles, and Charles. For the more accurate determination of the specific gravities of liquids and solids, see SPECIFIC GRAVITY.

AREOP'AGUS. See AREIOPAGUS.

AREQUI'PA, a term primarily applied to a mountain in the west Cordillera of the Peruvian Andes, and secondarily to a city at its foot, being from this, again, extended to a district, a province, a department, and a diocese. 1. The city, which is in lat. $16^{\circ} 13'$ s., and in long. $72^{\circ} 18'$ w., is the third largest in Peru, being inferior only to Lima and Cuzco, and is said to contain 35,000 inhabitants. It carries on a considerable trade both with the interior and by sea. Its port is Islay, one of the larger harbors of the republic. 2. The department is bounded n. by Lima; e. by Ayacucho, Cuzco, and Puno; s. by Moquega, which, along with it, forms the diocese; and w. by the Pacific. It contains 160,000 inhabitants, and is subdivided into seven provinces. Like nearly the whole of the maritime region of Peru, it is generally arid and sterile. 3. The mountain is volcanic, of the form of a truncated cone, and of the height of 20,320 feet. Its neighborhood is subject to earthquakes.

ARÉS. See MARS.

ARETÆ'US, a famous physician of Cappadocia, who flourished in the latter half of the 1st, and in the beginning of the 2d c. after Christ. He is considered to rank next to Hippocrates in the skill with which he treated diseases; but he did not, in every instance, follow the practice of the "father of medicine." He was less attentive to "the natural actions" of the system, which he frequently counteracted, if he thought it desirable; administered active purgatives copiously, employed narcotics, and did not object to bleeding. He was, in fact, noted for his total want of professional bigotry; and hence, not committing himself to any particular set of opinions, in his accuracy in the detail of symptoms and the diagnosis of disease, he is superior to most of the ancient physicians. His great work, written in singularly elegant and concise Ionic Greek, is divided into two parts. The first four books treat of the causes and symptoms of acute and chronic diseases; the second, the cure of the same. They are almost in a state of complete preservation, and have been translated into various European languages, besides having been frequently edited in the original. The finest edition is the Oxford one of 1723, by J. Wigan; a German translation appeared at Vienna (1790-1802), and an English by T. F. Reynolds, London, 1837.

ARETHU'SA. See ALPHEIUS.

ARETHUSEÆ, a tribe of orchidaceous plants, found principally in south temperate regions (Australia); usually terrestrial; with terminal, lid-like anther, pulpy or powdery pollen, and numbering 18 principal genera, such as the vanilla of commerce, and in North America, *Arethusa*, *Calopogon*, and *Pogonia*.

ARETINIAN SYLLABLES are the syllables *ut, re, mi, fa, sol, la*, used by Guido d'Arezzo for his system of hexachords.

ARETINO, GUIDO, or GUIDO D'AREZZO. See GUIDO ARETINO

ARETINO, PIETRO, an Italian author of the 16th c., was the natural son of a gentleman named Luigi Bacci, and was b. at Arezzo, in Tuscany, on the 20th of Mar., 1492. Banished from his native town, he went to Perugia, where he wrought as a bookbinder, and gathered up a few scraps of learning, until, seized with a desire of becoming famous, he abandoned his occupation, and wandered through Italy in the service of various noblemen. At Rome, he distinguished himself by his wit, impudence, and talents, and secured even the papal patronage, which, however, he subsequently lost by writing licentious sonnets. A. now went to the Medicean court, where John de' Medici grew so fond of him that he shared his bed with the adventurer, and even procured him an opportunity of ingratiating himself with Francis I. at Milan in 1524. A few years later, he settled at Venice, where he also acquired powerful friends. The bishop of Vicenza not only soothed the irritation of the pope against A., but also recommended him to the emperor Charles V. The latter, as well as his chivalrous rival, Francis, and other great persons, pensioned the fortunate wit, besides enriching him with splendid presents. He likewise obtained considerable sums for his literary efforts.

Nature had undoubtedly gifted A. with some fine qualities, but these were vitiated by his love of sensual gratifications. His death in 1556 accorded with the character of his life. It is said that while laughing heartily at some trifling adventure of one of his abandoned sisters, he fell from a stool, and was killed on the spot. His poetical works include five comedies and a tragedy. The former are full of wit and genuine comic humor; the latter is not without merit. His *Sonetti Lussuriosi* have been translated into French, under the title of *Académie des Dames*. Besides these, he wrote a number of other pieces, some of which have not been published. His satire procured for him

the name of "the scourge of princes;" but it seems clear that he was equally well fitted to be their sycophant. Although the very impersonation of licentiousness, he had nevertheless the impudence to publish some books of a devotional kind, with the view of obtaining the favor of the pope.

ARETINO, SPINELLO, an early Italian painter of great genius, was b. at Arezzo in 1316, or, according to others, in 1333. He studied under Jacopo del Casentino; but before he had attained his majority, he had surpassed his master in the vigor and liveliness both of his conceptions and coloring. His reputation attained its full bloom after he went to Florence, where he painted in fresco, in the chapel of St. Maria Maggiore, several incidents in the life of the Virgin and of St. Antonio Abate. The monastery of San Miniato, near Florence, contains to the present day a few of his frescos. He also adorned the monasteries of San Bernardo at Arezzo and Monte Oliveto near Florence. Vasari thought that the finest works of A. were those which he executed for the Campo Santo at Pisa, illustrating the life of San Ranieri. Of these, however, we have only prints, and cannot therefore judge satisfactorily. His principal works, still remaining, are those from the life of pope Alexander III. in the town-hall of Siena. He d. in 1410.

Throughout all Italy, A. was greatly admired for his invention, the grace and simplicity with which he arranged his figures, and the finish of his style. His Madonnas possessed a remarkable sweetness of expression; and his coloring was in most cases bold and beautiful. Vasari prefers him to Giotto.

AREZZO (ARETIUM), the chief city of the Italian province of A., is situated in a fertile valley near the confluence of the Chiana with the Arno, lat. 43° 27' n., long. 11° 52' e. It is 38 m. e.s.e. from Florence. A. is perhaps the oldest town in Tuscany, and formed one of the 12 cities of the ancient Etruscans. It was devastated by Sylla during the social war; and, like many other Italian cities, was sacked by the Goths when they burst into the peninsula. During the contest of the Guelphs and Ghibellines, in a later age, it became subject to Florence, whose troops defeated those of A. at the battle of Camaldino, in which the poet Dante took part. The commune of Arezzo contained (1894) 44,000 inhabitants, the town proper between 11,000 and 12,000; but there are evidences of a more flourishing and more populous period. The *Piazza Grande*, the *Pieve*, an old church founded on the site of a heathen temple, and the cathedral, which, like almost all the other churches, has an unfinished façade, are its principal public buildings. The cathedral has a splendid high altar in marble by Giovanni Pisano; and the several churches contain fine specimens of the old Tuscan school of painting. These ecclesiastical decorations are contrasted with the general aspect of the city, which has dark and dirty streets. Its industry is at present at a very low ebb, there being few or no manufactures, and its people are not generally favorites in Italy; but perhaps no city of its size ever produced a greater number of celebrated men, among whom may be mentioned—Mæcenas, the famous patron of letters in the time of the emperor Augustus; Petrarch; Pietro Aretino; Guido de A., inventor of the gamut; Leonardo de A., the historian; Cesalpino, the botanist; Redi, the physician; pope Julius III.; the notorious marshal d'Ancre; and Vasari, author of *Lives of the Painters*. Michael Angelo was also born in the vicinity of A. The province of A. contains 1273 sq. m., with a pop. in 1895 (est.) 244,593. The soil is fertile in corn, wine, and oil.

ARGALA. See ADJUTANT.

ARGALI, *Ovis Ammon*, the great wild sheep of Siberia and central Asia. It is found from Kamtchatka to the Himalaya mountains, where, however, it is only seen in the more elevated regions. "We came suddenly," says Dr. Hooker in his *Himalayan Journal*, "upon a flock of gigantic wild sheep, feeding on scanty tufts of dried sedge and grass; there were 25 of these enormous animals, of whose dimensions the term sheep gives no idea; they are very long-legged, stand as high as a calf, and have immense horns, so large that the fox is said to take up his abode in their hollows when detached and bleaching on the barren mountains of Tibet." The horns of the male are nearly 4 ft. long, and 14 in. in circumference at the base, where they are triangular. The general color is fulvous gray, white beneath, with a whitish disk around the tail. The wool is concealed by hair. The name A. is Mongolian, and was adopted by Pallas. A similar but smaller species is also found on the Himalaya mountains. The Rocky mountain sheep, or bighorn, is sometimes called the American A. See SHEEP.

ARGALL, Sir SAMUEL, 1572-1639; one of the early colonists of Virginia. He became famous for carrying off the more famous Pocahontas, daughter of the Indian chief Powhatan, and presenting her to the government of the colony as a slave. A., it is said, bought the girl from the Indian having charge of her, for a brass kettle. In 1613 A. broke up the French settlement at Mt. Desert, Me., and the act was the cause of war between the English and French colonists, in which the settlements of the latter at Port Royal and St. Croix were destroyed. In 1617 he became deputy governor of Virginia, where he violated the established laws, and made others to favor illegal trade in which he had the earl of Warwick for a partner. Instead of being punished he was shielded by his powerful partner, both acquiring immense wealth, to which A. made large additions by robbing the estate of lord Delaware, of which he was administrator. He was captain in the expedition against the Algerines in 1620, was knighted the next year by James I., and in 1625 was in Cecil's expedition against the Spaniards.

ARGAN, *Argania sideroxylon*, *sideroxylon spinosum* of Linnæus, a low spiny evergreen tree of the natural order *sapotaceæ*, a native of the southern parts of the kingdom of Morocco, bearing an ovate drupe about the size of a plum, dotted with white, and full of a white milky juice. The Moors extract an oil from the fruit, which they use with their food.

ARGAND, AIMÉ, physician and chemist, was born at Geneva about the middle of the 18th century. He was the inventor of the well-known *argand lamp*. The chief difficulties that attended the use of lamps as a source of light were—first, in procuring the complete combustion of the oil, so as to keep the flame from smoking; and second, in preventing the level of the oil in the reservoir from sinking as the combustion goes on. The round cotton-wick, used in the old simple form of lamp, was always attended with smoke and smell. The oils and fats are exceedingly rich in carbon, containing 70 to 80 per cent of that element, and only 10 to 12 of hydrogen. The round thick column, then, of oil-vapor rising from the wick of an old-fashioned lamp, presented too little extent of surface to the air; the oxygen of all the air that could get access was chiefly taken up in burning the hydrogen, and a large proportion of the carbon ascended in the burnt air as smoke. A.'s improvement was that he made the wick in the form of a ring. The flame thus became a hollow-cylinder with a current of air ascending through the inside, so that the burning surface was doubled. It would appear, however, that the



Argand Burner. lamp did not satisfy the expectations of A., till his younger brother accidentally discovered the effect of a glass cylinder, as a chimney over the flame, by which the flame was steadied, a draught created, and the greatest possible amount of light yielded.

A. was soon involved in a dispute with one Langé of Paris regarding the originality of his invention. He went thither to vindicate his claim, but rather than risk the chances of a lawsuit, he consented to share the honor, and a patent was obtained by which Langé and A. alone were authorized to make and sell the new lamps in France for 15 years. The French revolution, however, destroyed their privilege, and A. retired to England. After some time, he returned to his native country, a victim to melancholy and fantastic humors, and d. on the 24th Oct., 1803.

ARGAUM, a village in the territory of the Nizam. It is in lat. $21^{\circ} 2' N.$, and in long. $77^{\circ} 2' E.$, on the route between Ellichpore and Aurungabad. Its single claim to notice is that, on 28th Nov., 1803, about two months after the battle of Assaye, Major-Gen. Wellesley here gained another victory over the Mahrattas. To commemorate this action, a medal was struck in 1851, about a year before the death of the illustrious conqueror.

ARGEL, or **ARGEEL**, *Solenostemma A.*, or *Cynanchum A.*, a plant of the natural order *asclepiadaceæ*, a native of Arabia and of the north of Africa, deserving of notice only because of the frequent use of its leaves for the adulteration of senna. They are lanceolate and leathery, and may readily be distinguished from genuine senna leaves by their texture, their being downy, their greater heaviness, the comparative absence of veins, and the symmetry of their sides, the sides of the true senna leaves being unequal. They are acrid, and cause sickness and griping, but a difference of opinion subsists as to their possessing purgative properties.

ARGELANDER, FRIEDRICH WILHELM AUGUST, one of the most eminent astronomers of our time, was b. Mar. 23, 1799, at Memel. He studied at Königsberg, where the science of finance first attracted him; but he was subsequently drawn away to that of astronomy by the lectures of Bessel, by whom he was employed to make calculations and observations. In 1820, he was appointed assistant to Bessel in the Königsberg observatory, and in 1823 succeeded Walbeck as astronomer at the observatory of Abo, in Finland. Here he commenced a series of observations on the fixed stars which have a perceptible "proper motion." His studies were unfortunately interrupted by a fire which destroyed the observatory; but after a time, he resumed them in a new observatory at Helsingfors, and published a catalogue of not less than 560 stars having "proper motions." This contained the results of his observations at Abo, and received from the academy of St. Petersburg the great Demidov prize. After removing to the university of Bonn in 1837, A. published his *Uranometria Nova* (Berlin, 1843), containing celestial charts of the fixed stars seen in our hemisphere with the naked eye; also (in 1846) his *Astronomical Observations*, containing the results of an examination of the northern heavens from 45° to 80° declination. His *Atlas of the Heavens* will combine with these works to perpetuate his memory. A. was long engaged in a series of observations on the changes of light in variable stars, and he also demonstrated the theory that there is a progressive motion of the solar system in space. He d. in 1875.

ARGEMONE, a genus of plants of the natural order *papaveraceæ*, distinguished by 4 to 6 petals, 4 to 7 radiating concave stigmas, and an obovate capsule, opening by valves at the point. *A. Mexicana*, sometimes called Mexican poppy, is an annual herbaceous plant with large yellow flowers, and sessile, waved and sinuated, spiny leaves, variegated with white. It is a native of Mexico and of the southern parts of the United States, and is now also common in many tropical and sub-tropical countries, in which it has been naturalized. Its seeds are narcotic, purgative, and diuretic, exhibiting in

a strong degree those qualities of the order of which the seeds of the poppy are devoid. They are used in the West Indies as a substitute for ipecacuanha, also instead of opium; and the juice of the plant is employed as a remedy for ophthalmia.—This plant is not unfrequently to be seen in flower-borders in Britain; but in the northern parts, at least, the seed is generally sown in a hot-bed.

ARGENS, JEAN BAPTISTE DE BOYER, Marquis d', 1704-71, born at Aix, in Provence. He was originally intended for a learned career; but, from a love of adventure, he entered the army at 15. Fascinated by a certain actress, he eloped with her to Spain, but was captured, and brought back to Provence. In spite of his glaring breach of discipline, he had the good-fortune to be employed in the French embassy to Constantinople, and on his return, re-entered the army. Being disabled by accidents in military service, and disinherited by his father, he tried his fortune in authorship, and by his *Lettres Juives*, *Lettres Chinoises*, *Lettres Cabalistiques*, and *La Philosophie du Bon Sens* (London, 1737), attracted the notice of Frederick II., then crown-prince of Prussia, and became a favorite at the court of Prussia when Frederick came to the throne. The king appointed him chamberlain, and a director of the Art Academy at Berlin, with a salary of 6000 livres. He was a constant associate of Frederick, who liked exceedingly the princely donation of 150,000 volumes to its library. He was editor of 40 volumes of the *Universal Bibliography of Romance*, in which are some novels of his own.

ARGENSOLA, LUPERCIO and BARTOLOMÉ LEONARDO DE, two of the first among the Spanish poets in the "golden age," were b. at Barbastro, in Aragon; the former in 1565, the latter in 1566. They studied at the university of Huesca. Lupercio afterwards went to Madrid, while Bartolomé entered the church. In character and fortune, however, they were closely united throughout the whole of their career. Both were patronized by Marie of Austria, who appointed the one her chaplain, and the other her private secretary. The latter was subsequently made chamberlain to the archduke Albert of Austria, and Philip III. appointed him historiographer of Aragon. Bartolomé was employed by the count de Lemos to edit the *Conquista de las Molucas* (Madrid, 1609); and when this nobleman was appointed as viceroy of Naples, both the brothers A., who had acquired fame as poets, attended his court at Naples, where Lupercio, who then filled the office of secretary of state, died in 1613. Bartolomé returned to Spain with the viceroy in 1616, and occupied the position formerly held by his brother, as historiographer of the kingdom of Aragon, where he proceeded with the work left unfinished by Lupercio—a continuation of Zurita's *Annals of Aragon*. While engaged in this work, he d. Feb. 26, 1631. The collected poems of the two brothers were first published in 1634, by the son of Lupercio, and passed through several editions. These poems (*Rimas*) consist of epistles, odes, sonnets, and satires, and are singularly alike in character. They are imitative of the style of the Latin poets (especially Horace, for which reason the brothers have been styled "the Spanish Horaces"), and display more care and polish than originality of invention or richness of fancy. Bartolomé A., as a prose-writer, is reckoned among the Spanish classics. The style of his continuation of Zurita is a great advance on the original, especially in correctness.

ARGENSON, MARC PIERRE, Comte d', a celebrated French statesman, was b. in 1696. After holding a number of inferior offices, he succeeded M. de Breteuil as secretary of state to the war minister in 1742. On the death of Cardinal Fleury, in the following year, the whole care of the war then raging devolved upon him. He found matters in the most deplorable condition. The French troops, decimated by sword and disease, were in full retreat across the Rhine; the Austrians already swarmed in Alsace and Lorraine, and the very political existence of France was imperiled; but A., by his vigor and lucky choice of generals, changed the fortunes of the war in the course of one year. After the victories of Fontenoy and Lawfeldt, and the capture of Bergen-op-Zoom, peace was secured by the famous treaty of Aix-la-Chapelle, signed in 1748. A., however, did not remain inactive, he established the *Ecole Militaire* in 1751, and, by various measures, kept alive the military spirit of the nation. He was an illustrious patron of literature. Diderot and D'Alembert dedicated to him their great *Encyclopédie*; and to Voltaire, whose fellow-student he had been, he furnished materials for his *Siècle de Louis XIV.* In 1756, he was exiled to his estate, it is supposed by the machinations of Madame Pompadour. On her death he returned to Paris, where he d. in 1764.

ARGENSON, MARC ANTOINE RENÉ DE PALMY, D', 1722-87; a French diplomat and author, son of Louis XVth's minister of foreign affairs. He was envoy to Poland, Switzerland, and Venice; a member of the Royal Academy, and is gratefully remembered for his frank and vivacious character, but used to tease him on account of his hypochondriacal fits. When almost a sexagenarian, he renewed the adventures of his youth by again falling a victim to the charms of an actress, Mademoiselle Cochois, whom he married without Frederick's permission. This and other circumstances irritated the despotic monarch, who deprived A. of his pension. The latter now returned to Provence, and d. at Toulon, Jan. 11, 1771. His numerous writings, but especially his *Histoire de l'Esprit Humain*, *Lettres et Mémoires*, and those above mentioned, once enjoyed a considerable reputation.

ARGENSON, MARC RENÉ D', 1771-1842; a French soldier and statesman. He served as Lafayette's adjutant, and took part in the expulsion of the English from Walcheren. In 1809, he was prefect of Antwerp (then Deux-Nèthes), but resigned rather

than confiscate the property of the mayor at the order of the French ministry. He was elected deputy for Belfort in "the hundred days," and re-elected after the second restoration. In 1830 he appeared in the chamber to represent Strasburg, and in 1832 was one of the members who signed the *compte rendu*. The next year he put his name to the manifesto of the "Society of the Rights of Man." He was a prominent member of the Carbonari, and was to be dictator in case the expected revolution should succeed.

ARGENSON, RENÉ LOUIS VOYER D' (1694-1757), was Louis XV.'s minister of foreign affairs from 1741 to 1747, when he was forced to resign on account of the intrigues of Spain, whose policy he had frustrated in his negotiations with Italy. From this time he devoted himself to literature, and wrote, among other works, *Considérations sur le gouvernement de la France*.

ARGENT, the French word for silver, is always used in English heraldry to signify that metal. In engraving shields it is left white.

ARGENTA, a t. of central Italy, in the province of Ferrara, and 18 m. s.e. from Ferrara, on the Reno, in the plain near the marshes of Comacchio. Pop. of commune, 15,926, of town about 6000.

ARGENTAN, a t. of France, department of Orne, and chief t. of the arrondissement of the same name. It has an ancient castle, manufactures of linen and lace, and bleach-fields. Pop. nearly 5000.

ARGENTEUIL, a co. of Quebec, Canada, on the Ottawa river; 850 sq. m., pop. '91, 15,158. The soil is good, and there are valuable deposits of buhr (burr) stone. Principal t., Lachute.

ARGENTEUIL, a t. of France, in the department of the Seine-et-Oise. Its priory, now in ruins, was founded in the 7th c., and was by Charlemagne turned into a nunnery, of which the famous Héloïse became abbess. Pop. of A., 11,600.

ARGENTEUS CODEX. See ULFILAS.

ARGENTINE, *Argentina*, a genus of small fishes of the family *salmonide*, of which one is rarely found on the British shores, and two or three are found in the Mediterranean. They are chiefly remarkable for the resplendent silvery lustre of their sides, and the abundance of *naere*, the substance used in making artificial pearls, with which their air-bladder is externally loaded. It consists of a coat of silvery fibers. Upon account of it, they are sought after. They are commonly taken in nets along with anchovies or sardines.

ARGENTINE REPUBLIC, sometimes simply called ARGENTINA; formerly known as the Confederation of the Rio de la Plata (river of silver, a misnomer), is, next to Brazil, the largest federal republic of South America, and lies between lat. 22° and 56° s., long. 53° 30' and 72° w.; bounded on the north by Bolivia and Paraguay, on the east by Brazil, Paraguay, Uruguay, and the Atlantic ocean, on the south by the Atlantic, and on the west by Chile; the Andes separating the two countries. A number of islands are included, and the Falkland islands off the coast have been claimed by the Republic, but are still held by Great Britain. The total area, including eastern Patagonia and part of Terra del Fuego, is about 1,125,086 square miles, divided between one independent municipality (Buenos Ayres), fourteen organized provinces and nine territories.

History.—The river Plata was entered in 1516 by Juan Dias de Solis, who was searching for a southwest passage to the East Indies, and in 1526 Sebastian Cabot ascended the Paraná nearly to its confluence with the Paraguay, there founding a colony, and giving the name la Plata (silver) to the stream, from the abundance of silver ornaments worn by the Indians. A wealthy expedition left Spain in 1534 for the new country, and in 1535 Buenos Ayres was founded, which in 1536 was destroyed by the Indians, rebuilt in 1542 and abandoned in 1543, and not permanently established until 1580. Meanwhile Asuncion (1536), Santa Fé (1573), and other places had been settled, and horses and cattle had been introduced. Spanish colonists from Peru had founded cities in the n.w., Tucuman (1565) and Cordova (1573), and down to 1775 the basin of the river Plata was a dependency of the viceroyalty of Lima. In that year the viceroyalty of Buenos Ayres was formed, including Bolivia, Paraguay, and Uruguay, and the country was governed by viceroys until 1806, when, during the war of France and Spain against England, Buenos Ayres and Montevideo were occupied by the English. The first-named city, however, was recaptured by the Argentines, who, forced to defend themselves, saw the need and advisability of independence of the mother country. Accordingly, they refused in 1808 to acknowledge Joseph Bonaparte as king of Spain, and in 1810 formed, under a viceroy, a provisional government, replaced in 1813 by a dictatorship. Civil strife followed, and in 1816 a general congress declared the independence of the "United provinces of Rio de la Plata," though this was not substantially attained without war, 1817-24, and was not recognized by Spain until 1842. During 1826-28 there was war with Brazil for the possession of Banda Oriental (Uruguay), and from 1827-31 the Plata provinces were practically isolated from each other. In 1831 Buenos Ayres, Entre Rios, Corrientes and Santa Fé formed a federal compact and invited the others to join them, but little but anarchy resulted till 1835, when General Rosas was elected captain-general or governor with almost absolute power. His efforts to make Buenos Ayres supreme led to his downfall in 1852, and in 1854 Buenos Ayres declared itself independent, but was defeated in 1859 and obliged to re-enter the confederation,

but during another war, 1861-62, this province regained its position, and the city of Buenos Ayres became the capital of the confederation instead of Paraná. During 1865-70 a war was waged against Paraguay by the Argentine Republic, Brazil and Uruguay, with little benefit to the Republic. In 1881 a treaty was made with Chile by which the Argentine Republic acquired all the country east of the Andes, comprising Patagonia and the eastern part of Terra del Fuego. In July, 1890, a revolution broke out, aided by the army and navy, the result of the political and financial corruption of the cabinet officers, and the stagnation in business produced by debasement of the currency. President Celman was forced to resign, and was succeeded by Dr. Carlos Pellegrini.

Topography.—The high table-lands or cordilleras of the Andes, between parallels 67° 30' and 69° 30' w., have an average elevation of 13,000 feet, while there are many lofty peaks, always snow-covered, some of them active volcanoes, the highest of which are Aconcagua (22,422 feet) and Tupungato. In the north, lower ranges lie parallel or nearly so to the cordilleras, and are separated by stretches of desert. The Sierra de Cordova, bounding on the west the province of the same name, and the central table-lands have a considerable elevation. There are hills in the province of Buenos Ayres with an average elevation of 300 feet, and southwest of these is a parallel range, attaining a height of over 3000 feet. The eastern ranges are largely composed of granite or granular quartz; the Andes consist of granite, gneiss, schists, porphyries, etc. The greater part of the country is not mountainous, but comprises three extensive plains: the Gran Chaco (great hunting-ground), north of the Salado river; the central prairies or pampas between the Salado and Rio Negro, with an area of more than 300,000 square miles, and the undulating uplands of Patagonia. The northern plains and pampas, according to Darwin, are simply the old alluvial deposits of the Plata, subsequently upheaved, and are composed of earth in the form of sand; the Patagonian plateaus were originally the bed of the ocean, and are composed of gravel or clay. Throughout the cordilleras much sublime and beautiful scenery is found. In the Cuyo district, as the provinces of San Luis, San Juan, and Mendoza are called, is a valley 200 miles long, which is said to rival the celebrated valleys of Switzerland. Glaciers exist in the Hermoso valley, and on the Iguazu river, a branch of the upper Paraná, are falls said to exceed Niagara in height. The Patagonian Andes contain many beautiful valleys, and the southern plains are broken by a number of broad and fertile intervals. There are many desert or sterile tracts of land throughout the Republic, and saline marshes or dry beds of what were once salt lakes are common.

The Plata (q. v.), an estuary rather than a river, is the mouth through which the Paraná (q. v.) and Uruguay discharge their waters. The chief tributaries of the Paraná are the Paraguay, navigable for 1000 miles, the Salado and the Vermejo, these last being navigable for from 400 to 500 miles. The Pilcomayo, which since 1876 has formed part of the boundary with Paraguay, is navigable for nearly its entire length (about 1200 miles). The southern rivers, such as the Rio Negro and Rio Colorado, flow directly into the Atlantic. Many of the small rivers of the interior disappear during the dry season. The principal bays indenting the coast are those of San Matias and St. George. The Los Estados islands and the small islands close to the eastern division of Terra del Fuego belong to the Republic. The straits of Magellan are neutral, and neither the Republic nor Chile is allowed to erect fortifications upon them.

Minerals.—Among those found in the Andes are silver, tin, lead, and bismuth. Gold is obtained in the Aconquija mountains, in the northwest (which yield silver and copper also), in the central province of Cordova, and from the beach and river sands of the extreme southeastern part of Patagonia. Salt, alum, borax, sulphur, chalk, building stones and beautiful marbles are common. In the Andean province of Rioja, iron ore is found, and also in the Gran Chaco. There are deposits of coal in the northern part of the Republic, and petroleum wells in the western part, in the province of Mendoza. In no instance has mining proved very profitable. The shipments of the precious metals, minerals, ores, etc. for 1894 amounted to \$219,581.

Fauna and Flora.—The larger wild animals found in the forests are the jaguar, cougar, ant-eater, chinchilla, and tapir. The pampas and plains are inhabited by deer, wild cats, wild dogs, pumas, wild boars, skunks, armadillos, foxes, and several burrowing quadrupeds. The huanaco, vicuna, and llama range from the mountains to the plains, the capybara frequents the rivers, and the coypu is met with along the Plata. The condor, vulture, several species of nandu or American ostrich, several of partridge, the hawk, flamingo, burrowing owl, and waterfowl of many kinds, parrots, humming-birds, and other birds of gay plumage are seen in the mountain regions or on the open plains. There are several large and venomous serpents, spiders, and mosquitos of great size, destructive locusts and ants, annoying chigoes and "flying bed-bugs;" seals, otters, sea-lions, and sea-elephants are captured along the coast, and the rivers supply trout, lampreys, skates, soles, and many other fish. Most interesting fossil remains are found in different parts of the Republic, more than fifty species having been obtained, among them the megatherium, toxodon, and horse.

The slopes of the Andes are well wooded, especially with thorny and shrubby plants, as are the banks of the Paraná and the rivers flowing from the west into the Paraguay, though the trees do not attain great size. Palms are a distinctive feature of the base of the Sierra de Cordova and of the northwestern foothills. The

pampas in the wet season are covered with clover and thistles, or with tall grass and flowers, gay verbenas, geraniums, etc., but here as well as on the Gran Chaco there is little to form thickets except mimosas and cacti. The *algarrobo*, a shrub resembling a honey locust, is widely distributed. It is used for fence posts, and from the pulp of the pod are made a kind of flour and, by fermentation, an intoxicating liquor called *chicha*. Patagonia is almost treeless, except in the south, and even there but four species of trees are found, two of them being beeches. Among the indigenous trees and plants are the quince, aloe, coca, cinchona, maté or Paraguay tea, manioc, the prickly pear with edible fruit, the *cactus foliosus*, on which the cochineal insect feeds, and a shrub harboring an insect yielding a handsome green dye. The apple-tree, introduced from Chile by the Indians, flourishes in the southwestern provinces; the grape is extensively grown in the western and adjoining provinces of Rioja, San Juan and Mendoza; the province of Salta is famed for its bananas and coffee, and the peach, fig, orange and walnut are grown in many parts. The scarcity of wood in some provinces compels the use of dried thistles and peach tree cuttings for fuel.

Climate.—This is healthful but very dry, especially in the extreme north, and on the central and southern plains. The temperature at Buenos Ayres, which has the most agreeable climate of any of the cities, ranges from 73° in summer to 52° in winter, the yearly mean being about 64° Fahr. The *zonda*, a strong, debilitating wind from the north, is of frequent occurrence, and is generally succeeded by the *pampero*, a violent wind from the south, accompanied by heavy thunder and lightning, and when blowing across the land, producing severe sandstorms. The Cuyo district is said to resemble Alabama in its climate. The Argentine Mesopotamia has a more abundant rainfall than any other portion, and is seldom visited by frosts. The death rate of the Republic is low, and the prevalence of yellow fever in the cities in some years has been due to lack of sanitary regulations.

Agriculture is very backward, only about 6.2 per cent of the available land being under cultivation, in 1895 the rearing of live stock having proved more profitable; but the soil in general is fertile and much apparently sterile land has been reclaimed by systematic irrigation, especially along the slopes of the Andes, where artesian wells have been sunk. Wheat, barley, oats, alfalfa, potatoes, Indian corn and tobacco are extensively grown. Cotton, flax and peanuts have been introduced within recent years. The sugar-cane is cultivated in the north-east, and cotton is grown in Catamarca. Oranges, olives, grapes, figs, and dates are among the fruits raised, and much attention has been given to silkworm culture. Immense herds of cattle, sheep, mules and horses are pastured on the pampas. In 1894 the chief agricultural products were: wheat, 2,044,957 tons, and maize, 608,000 tons. The value of the harvest of 1893 was reckoned at \$100,255,000 in gold. In 1888 the number of cattle was estimated at 22,000,000; of horses, at 5,200,000; of sheep, at 80,000,000, and of other cattle, 1,998,000. The Aconcagua goat is bred for its fine skin, and the Angora goat has been introduced.

Commerce, which was greatly stimulated by the opening of the Plata to all nations in 1852, is carried on by sea through the ports of Buenos Ayres and Rosario. An extensive inland trade is carried on by means of the Paraná and Uruguay rivers, by steam railways and horse railways and by caravans of wagons and trains of pack-mules. The chief articles of export in their order of importance in 1894 were, animals and animal products, agricultural produce, forest produce and minerals. In that year the exports of wool were 161,908 tons; of wheat, 1,608,000 tons; of meat, 80,000 tons; of maize, 54,876 tons, and of sheep skins, 36,736 tons. In addition to these may be mentioned among the exports, tallow, bones, ox-hides, flax, salted beef, cabinet woods and guano. The chief countries receiving the exports in 1894 were Great Britain, France, Brazil and Belgium. The next in order of importance were Germany, United States and Italy. Great Britain imports more largely to Argentina than any other country, the staples being cottons, woolen, iron and machinery. The imports into Argentina in the order of importance are, textiles and apparel, iron and iron manufactures, food substances, coal, coke, oil, etc., drinks, wood and wood manufactures, chemicals, paper and paper manufactures, etc. The trade with Europe has been facilitated by the establishment in Argentine cities of branches of foreign mercantile houses. The total value of imports in 1894 was 92,724,102 pesos, including, among other classes of goods, textiles and apparel, 29,514,258; iron and iron manufactures, 14,251,133; food substances, 9,812,078; coal, coke, etc., 8,784,051; drinks, 6,953,564; wood and wood manufactures, 5,387,532; chemicals, 4,234,414; paper and paper manufactures, 3,194,506. The exports in 1894 had an aggregate value of 101,248,824 pesos, including animals and their produce, 60,519,801; agricultural produce, 32,520,256; manufactured produce, 4,394,394; forest produce, 1,511,145; minerals, 311,653, etc. The total import of gold and silver in 1894 was 3,188,395 pesos, of which 2,843,036 were gold and 345,359 were silver. The total export of gold and silver in that year was 266,543 pesos, of which 140,677 were gold and 125,866 were silver. The foreign trade with the United States in 1894 showed an increase over that of the preceding year. The exports to Great Britain had a total value of 20,410,884 pesos; to France of 18,843,963; to Belgium of 12,769,341; to Germany of 11,544,515; to the United States of 5,285,210; to Italy of 3,066,767, and to Brazil of 13,869,404. The imports from these countries were—Great Britain, 33,118,014; France, 10,156,320; Germany, 10,689,487; United States, 10,149,018; Belgium, 8,958,561; Italy, 8,873,377, and Brazil, 2,079,429. The tonnage of vessels entered in the foreign trade at Argentine ports for the year 1894 was 5,605,440 steamers, and 1,082,531 sailing vessels; total 6,687,971.

Manufactures, aside from animal products, such as leather, tallow, soap, Liebig's extract of beef, and artificial guano, have not yet assumed great importance, but increasing attention is given to the production of sugar, wine, agricultural implements, iron utensils, chemical manufactures, and there are a few factories for woolen and linen goods, and of furniture. The more distinctive native manufactures are those of baskets from the willows of the Paraná islands; the homespun cotton and woolen cloths, blankets, rugs and laces and embroideries of the northwestern highland provinces; the tanned leather, wooden ware, laces, blankets, etc., of Cordoba; and the harness, belts, ponchos, horse-blankets, ropes, etc., made by the Indians in different provinces.

Railroads, Telegraphs, Post Offices, Banks, etc.—In 1894 there were in operation 8,156 miles of railroad, the total capital being \$439,078,236 (1895). This shows a remarkable increase since 1880 when the total mileage was only 1,536. A railroad is under construction from Mendoza at Santa Rosa de Los Andes in Chile, crossing the Cordilleras at an elevation of over 10,000 feet above sea level, and at the summit using a tunnel over two miles long. Over half of the capital invested in 1895 corresponded to private companies' lines, but a considerable portion of the railway business is in the hands of the government, a still larger portion consists of lines subventioned by the provinces and a larger part yet consists of guaranteed lines.

The total length of telegraph lines in 1894 was 20,415 miles of which 11,250 miles belonged to the government, 1,115 miles to cable companies, and 8,050 to railway companies.

A "snow cable" connects Buenos Ayres with Valparaiso (by way of the Uspullata pass), whence a submarine cable connects with San Francisco, California. Buenos Ayres is connected with Montevideo by submarine cable and also with Europe by way of Rio de Janeiro and the Cape Verde islands, and in this indirect way with the United States also. There is besides a cable between Buenos Ayres and Lisbon. The post offices in 1893 numbered 1456, through which passed 123,618,580 inland letters and packages, and 18,500,000 international. Stage coach lines carry mails into the interior not accessible by rail, and congress annually appropriates about \$2,000,000 as subsidies. There is mail communication with Europe nearly every day. It is said that Buenos Ayres has more telephones in use in proportion to its population than most American cities.

By law of Nov. 3, 1887, national banks resembling those of the United States were established. At the close of March, 1895, the aggregate circulation of the Argentine national banks was \$286,693,023, a slight decrease over the outstanding circulation at the same date in 1894. By the law of 1889 the paper money, of the national banks was to be gradually reduced to \$100,000,000, but in May 1890 a new issue was authorized. This resulted in a further depreciation of paper money, so that the average quotation of the value in paper money of \$100 in Argentine gold for the year 1891 was \$373. Since then matters have improved somewhat, the average quotation for 1895 being \$344. In that year the notes of the Argentine national banks were worth about thirty cents on a dollar. Of the note circulation during the year 1895, \$11,848,600 consisted of treasury notes. In October, 1891, the old National Bank was placed in liquidation and a new bank called, The Bank of the Argentine Nation was opened in the following December. The bad condition of the Hypothecary Bank of the Province of Buenos Ayres has added to the confusion of the currency. The National Hypothecary Bank has also been in difficulties, though continuing to do business. The silver dollar, or *peso fuerte*, of the Republic is equal to 100 centimos. The peso was quoted by the U. S. Treasury in Oct., 1896, as equivalent to \$0.965 in gold. The weights and measures are the quintal = 101.40 lbs. avoirdupois; the arroba = 25.35 lbs. avoirdupois, and the fannega = 1½ imperial bush. In 1887 the use of the French metric system was made compulsory.

Education was very limited in its range and entirely under the direction of the Roman Catholic church until 1868, when General Sarmiento, who had been Argentine minister at Washington, was elected president. Having written much on education as observed in the United States, and translated many text-books into Spanish, he was well fitted to reorganize the educational system, if such it can be termed, of his own country, and by his efforts normal schools, or schools of application as they are called, were established. These are now found in every part of the Republic, and together with the seminaries for young ladies, are under teachers from the United States, chiefly women. Instruction is classified as primary, secondary, and scientific or superior. Primary instruction in Buenos Ayres and the nine provinces is under a council of education appointed by the general government. In the fourteen provinces it is under their respective governments, and the taxes established by the education acts of these provinces support the schools. By law of 1884, primary instruction is obligatory, free and graded. Secondary or preparatory education is controlled by the general government, which supports sixteen lyceums. Scientific instruction is given in the Universities of Buenos Ayres and Cordoba (founded as a college in 1610), which comprise faculties of law, medicine and engineering, a school of mines, two colleges of agriculture, a naval and a military school. In 1892 there were 2,731 elementary schools with 6,864 teachers and 228,439 pupils. The annual appropriation for the support of elementary education is very large. In 1890 it was \$10,415,789. The government maintains a meteorological bureau, and there are two well-equipped national observatories at Cordoba and La Plata respectively. There are also national museums at Buenos Ayres and La Plata.

Government.—This is modeled upon that of the United States. The constitution of

1853, revised in 1860 and 1862, provides that the president and vice-president shall be Roman Catholics, of Argentine birth, shall be elected for a six years' term by 133 representatives of the fourteen provinces, and shall be ineligible to re-election. The President, who receives a salary of \$36,000, is commander-in-chief of the army, and appoints to all offices, but with his five ministers is responsible and may be impeached. The Vice-President (salary \$18,000) is chairman of the senate, which consists of thirty members elected for nine years, two being chosen by each province and two by the capital. Each must be thirty years of age, an enrolled citizen of six years' standing, and have an income of \$500. The senate is renewed by thirds every three years. The house of deputies or representatives consists of eighty-six members, whose only qualification was that they had been enrolled citizens for four years after attaining their majority. The house of deputies is renewed by halves every two years. Congress meets annually from May 1-Sept. 30. The provinces are virtually independent, electing, every three years, their own governors and legislatures, enjoy a full measure of local and municipal government, and may contract internal or external loans on their own responsibility. The city of Buenos Ayres is under governmental control. The supreme court consists of five judges and an attorney-general, and is also a court of appeal. There are inferior local courts, trial by jury being established for criminal cases. The territories are directly governed by the President and his cabinet.

The bonded debt of the Argentine Republic on Dec. 31, 1894, was \$380,279,173 in gold and \$48,844,774 in paper. Of this \$190,990,673 in gold was the amount of the external bonded debt. The expenditure for the year ending March 31, 1895, amounted to \$19,271,941 in gold and \$72,065,221 in paper. The revenue for 1894 was \$27,790,500 in gold and \$24,861,412 in paper. The government estimates of revenue and expenditure for the year 1896 were \$31,048,000 in gold and \$49,560,000 in paper. In 1894 the estimated expenditure of the 10 provinces was \$30,312,519, and in 1895 the provincial debts amounted to \$137,261,866 in gold.

Army and Navy.—The army in 1894 comprised 37 generals, 685 infantry officers, 507 cavalry, 167 artillery, and 2 engineers. The privates numbered 6,498, but in 1895 it was provided that the force should be increased to 14,194. The national guard, which may be called out in time of war, is estimated at 480,000. The infantry is composed of twelve regiments of three battalions each. The navy consists of seven armed vessels, four cruisers, seven gunboats, three torpedo gunboats, torpedo boats of the larger size, and four vedette boats. The *Garibaldi* and the *San Martin*, twin armored cruisers, were purchased from the Italian government. They have each a tonnage of 6500, with 13,000 horse power. The *Almirante Brown* has a tonnage of 4200, the *9 de Julio* 3575, and the *25 de Mayo* 3200. A squadron of evolution was formed in 1887. The army and navy are recruited by voluntary enlistment.

Races. Manners, and Customs.—As described by Clemens, the upper, but numerically inferior class, comprises the pure-blooded descendants of the Spanish colonists, whose name for themselves is *gente decente* (literally, decent people). This class includes the learned and mercantile professions, the army, politicians, and many resident foreigners. Social life in the cities resembles that of the capitals of southern Europe, and the people are said to be intelligent, dignified, suave, hospitable, fastidious in dress, and punctilious in manners. The ladies follow European fashions, are vivacious and give much time to church services and to music. The men pay great deference to the women in public, but married people are seldom seen together on the street. Mourning is worn three years for a husband, two years for a parent, and one year for a sister or brother. The chief festal season is the Carnival preceding Lent; the national holidays are May 25, when (1810) independence was declared at Buenos Ayres, and July 9, when (1816) the united provinces declared themselves free. Next to this class come the Gauchos or horsemen of the pampas, who are the descendants of the Spanish and Indians, live in mud huts thatched with grass, wear a picturesque dress, and are skilled in the use of the lasso and the *bolas*, a missile weapon consisting of three balls united by thongs. Their chief occupation is the catching and taming of cattle. Classed as they are together with the degraded laborers imported from Europe, as peons, their lot is a peculiarly hard one. The Indians are mainly of Araucanian descent, are divided into separate tribes, live on grains and mares' flesh, and by their frequent outbreaks have given the government much trouble. The Patagonian Indians are nomadic.

Immigration has received every encouragement, and a homestead law grants, on easy conditions, 1500 acres to *bona fide* naturalized settlers. In 1887 it was estimated that there were in the Republic, 280,000 Italians, 150,000 French, 100,000 Spanish, 40,000 English, and 20,000 Germans. The immigrants in 1894 numbered 107,104.

Religion.—The established religion is the Roman Catholic under the archbishop of Buenos Ayres and five suffragan bishops, but all creeds are tolerated. There are many convents, a few monasteries, and five seminaries for the education of the clergy. Protestantism increases almost solely through immigration. By law of 1888 marriage was made a civil contract.

Population.—The following statistics, from the *Statesman's Year Book* for 1896, are mainly official estimates for 1895. In 1895 Buenos Ayres and its suburbs had a population of 665,243; Cordoba, 54,400 inhabitants; Rosario, 124,305; Tucuman,

25,000; La Plata, 60,982; Mendoza, 28,709; Paraná, 18,000; Salta, 20,000; Corrientes, 14,500.

PROVINCES.	Area in sq. m.	Population.	Chief Towns.
Littoral — Buenos Ayres (1889).....	.....	665,243	....
“ “ (prov.).....	63,000	921,222	La Plata.
Santa Fé.....	18,000	405,360	Santa Fé.
Entre Ríos.....	45,000	302,571	Concepcion.
Corrientes.....	{ 54,000 31,500 }	{ 239,344 70,010 }	Corrientes.
Andes — Rioja.....	29,700	{ 89,645 84,239 }	Rioja.
Catamarca.....	54,000	114,814	Catamarca.
San Juan.....	54,000	353,000	San Juan.
Mendoza.....	18,000	81,537	Mendoza.
Central — Cordoba.....	31,500	160,534	Cordoba.
San Luis.....	13,500	213,000	San Luis.
Santiago.....	45,000	118,107	Santiago.
Tucuman.....	27,000	55,000	Tucuman.
Northern — Salta.....	.....	.....	Salta.
Jujuy.....	.....	.....	Jujuy.
	515,700	3,873,626	
TERRITORIES.			
Misiones.....	23,932	100,000	....
Formosa.....	125,612		
Chaco... }			
Pampa.....	191,842		
Rio Negro.....	268,000		
Neuquen.....			
Chubut.....			
Santa Cruz.....			
Terra del Fuego)			
Total.....	1,125,086	3,973,626	

But the preliminary report of the Census of May 10, 1895, gives the number of the inhabitants as 4,042,990. See *Monthly Bulletin of the Bureau of American Republics* (Jan., 1897); also the British and American Consular Reports, and those of the government; Schnepf, *Mission Scientifique dans l'Amérique du sud* (1864); Napp, Leighton, *The Argentine Republic* (1878); Dairea, *Buenos Ayres, la Pampa et la Patagonie* (1878); Arcos, *La Plata* (1882); Bove, *Patagonia Terra del Fuoco* (1883); Crawford, *Across the Pampas and the Andes* (1884); Paz Soldan, *Geografia Argentina* (1885); Child, *Spanish American Republics* (1891); Turner, *Argentina and the Argentines* (1892); Mulhall, *Handbook of the River Plate* (1893); Akers, *Argentine, Patagonian, and Chilian Sketches* (1893), and Goodwin, *Wheat Growing in the Argentine Republic* (1895). Among purely historical works are Sarmiento's *Life in the Argentine Republic in the Days of the Tyrants* (trans. 1868); *History of the Argentine Republic*, by Dominguez (trans. 1866), and Saldias, *Historia de Confederación Argentina* (2d ed. 1892).

ARGES, a genus of small fishes, of the family *siluridæ*, of extreme interest on account of their being frequently thrown out in vast numbers by some of the South American volcanoes, with torrents of muddy water. Humboldt was the first accurately to inquire into this wonderful fact, and to describe one of these fishes, which he referred to the genus *pimelodes*, and called *P. cyclopus*. It is now called *A. cyclopus*. The quantities of these fishes ejected from the volcanoes in the neighborhood of Quito is sometimes so great, that the stench of their putrefaction is felt at a great distance, and putrid fevers are caused by it. They are expelled from craters or from lateral openings at an elevation of 16,000 or 17,000 ft. above the sea. It is supposed that they exist in lakes within the cavernous recesses of the mountains, but nothing is positively known on this subject. Their capacity of enduring the high temperature of the water with which they are ejected, has excited much interest. Several species are known, to which the common name of *perñadillas* is given in the country, and which are placed by ichthyologists in the genus *A.*, and the closely allied genera *brontes* and *astroblepus*.

ARGHOOL, a wind-instrument now used in Egypt, made of common cane with a reed mouth-piece.

ARGIL, clay or white clay, a term now little used, but of which the derivative *argillaceous* is still in frequent use as descriptive of soils, geological deposits, etc., and in the name *argillaceous slate* or *argillaceous schist*, instead of which, however, the name *clay-slate* is more generally employed. The term *argillaceous* is rather vague, and sometimes *clayey*, sometimes *aluminous*, would seem to be its equivalent. See **ARGILLACEOUS ROCKS**; **SLATE**.

ARGILE PLASTIQUE, a series of beds at the base of the tertiary system in France, resting on a conglomerate or breccia of rolled and angular chalk-flints. They consist of extensive deposits of sand, with occasional beds of plastic clays, used for pottery. Marls occur, inclosing, in some places, the fluviatile shells that are met with in the same position in the London basin, and in others, large numbers of a species of oyster. Beds of impure lignite also occur.—The *A. P.* is the equivalent in the Paris basin of

the Woolwich and Reading series, or lower eocene of the English geologists. See EOCENE.

ARGILLA'CEOUS ROCKS. All rocks composed entirely or to some extent of clay are included under this title. Pure clay is known as *kaolin* or *porcelain clay*. It is a hydrated silicate of alumina. Decomposed feldspar, from which the silicates of potash, soda, etc., have been washed out, supplies the material which forms kaolin. *Common clay*, however, contains many impurities; the chief are sand, in variable proportions, and oxide of iron, which gives its color to the mass. Any matter that contains sufficient alumina (more than 10 per cent.) to enable it to retain its shape when molded and pressed, is called clay. Plastic clays occur abundantly in the superficial deposits and in the tertiary strata. The older clays become more or less indurated. When they are regularly laminated, and split into thin layers in the direction of the laminae, they are called *shale*. In *clay-slate*, the clay has become highly indurated and metamorphosed, so as to split into plates that are altogether independent of the original lamination, and frequently cross it at right angles. Clay-slate forms extensive deposits in the azoic rocks but it is not confined to these, for the palæozoic shales are often converted into clay-slate, when, from their proximity to crystalline rocks, or other cause, they have been subjected to the action of heat.

A. R. can generally be distinguished by the peculiar "argillaceous" odor which they give out when breathed upon.

ARGIVES, or **ARGIVI**, a name often applied by Homer, and sometimes by others, to all inhabitants of Greece, but more accurately only to those of the more powerful state or government of Argolis, in whose chief city, Mycenæ, Agamemnon had his residence. (See **ARGOLIS**.)

ARGO, a large southern constellation in which is commemorated the mythical ship of the Argonautic expedition. Canopus, a star of the first magnitude, is its chief ornament; its declination, 52° 38' s., renders it invisible in the northern and central United States.

AR'GOL is a crude variety of cream of tartar which forms a crust in the interior of wine vats and wine bottles. Originally, it exists in the juice of the grape, and is soluble therein; but during the fermentation of the juice, and as it passes into wine, much alcohol is developed, which remaining in the fermenting liquor, causes the precipitation of the A.; the latter being very sparingly soluble in an alcoholic liquid. Some wines, when they are bottled, are not fully ripe, and more alcohol being thereafter developed, a further precipitation of A. takes place as a crust in the bottles, and hence the meaning of the term *crusted port*. A. is generally of a reddish tinge, obtained from the color of the grapes, but sometimes is of a grayish-white color, when it has been deposited during the fermentation of the juice of colorless grapes. The *red* or *white* A. is denominated in commerce *crude tartar*, and its principal uses are in the preparation of cream of tartar (q. v.) and tartaric acid (q. v.). The constituents of A. are bitartrate of potash (cream of tartar), (KO,HO,T), tartrate of lime, with coloring and extractive matters.

AR'GOLA. See **ADJUTANT**.

AR'GOLIS, the n.e. peninsula of the Morea (Greece), lying between the bays of Nauplia and Ægina, forms a nome, or department, in the modern kingdom of Greece. The plain of Argos, famous in ancient times for its breed of horses, is naturally fertile, but is now made pestilential by morasses. It is surrounded by an eastern continuation of the range of mountains on the n. of the Peloponnesus, which also girds the riven and shattered-looking coast. The highest summits attain an elevation of between 5000 and 6000 ft. The plain of A. is the most extensive in the whole peninsula, being 12 m. in length and 5 in breadth. The eastern part is higher and more rocky than the western. Near where the plain opens on the sea, the ground is marshy. This was the Lernean marsh of antiquity. The nome of A. and Corinthia has now Nauplia as its capital, and contains 144,836 inhabitants.

It was from the importance of the ancient kingdom of A. that the Greeks were collectively often styled Argivi by ancient writers. A. was colonized in very early times. According to the old traditions, Inachus, the Pelasgic chief, settled here in 1800, and Danaus in 1500 B.C., with colonists from Egypt. Here Pelops ruled, and was succeeded by Atreus, Agamemnon, etc. Here also Hercules was born, and achieved his victories over the Lernean hydra and the Nemean lion.

The ancient capital, Argos, was situated about 3 m. from the sea, and was considered the oldest city in Greece. It was supposed to have been built by that Inachus of whom we have spoken, or by his grandson Argus; but as the whole period in which his deeds are said to have been accomplished belongs to the unhistorical age, we cannot possibly determine the truth of such a statement. It is certain, however, that at one period A. was the head of a league composed of several Doric states or cities—Cleonæ, Philus, Sicyon, Træzen, Hermione, Ægina, and Epidaurus. Latterly, Sparta robbed it of its supremacy and influence. The population of A., during its most prosperous condition in ancient times, was—inclusive of the town territory—upwards of 100,000. It was noted for the attention it paid to the worship of the gods. Juno was the principal divinity, but many of the other gods had temples and statues also. This gave a stimu-

lus to the fine arts, and we know that A. possessed one of the most famous of the ancient schools of statuary. The natives were, moreover, renowned for their love of music. Herodotus considered them the finest musicians in Greece. They do not, however, seem to have cultivated literature. Few poets, and no orators or philosophers, were born amongst them. The modern Argos, built on the site of the ancient, is 7 m. from Naulpia, and is a large and thriving t. Pop. 11,000.

ARGON. A supposed chemical element discovered in the atmosphere by Lord Rayleigh in 1894. See CHEMISTRY, vol. III., p. 742.

ARGONAUT, *Argonauta*, a genus of cephalapodous mollusca, pretty generally known by the name of *paper nautilus*, and, in consequence of similarity in the form of the shell, often confounded with the genus *nautilus* (q.v.), but in fact much more nearly allied to the poulpe (*octopus*). The shell is not chambered like that of the true nautilus, but has one spiral cavity, into which the animal can entirely withdraw itself. The animal has no muscular attachment to the shell, and some naturalists therefore suspected that it might be merely, like the hermit crab, the inhabitant of a shell originally belonging to some other animal; but this question has been set at rest by the observations of Mme. Power, proving the beautiful but fragile shell to be the production of the A. itself. It has, however, also been discovered that the shell is peculiar to the female A., and does not answer the ordinary purposes of the shells of mollusca, but rather that of an "incubating and protective nest." The eggs, which are very numerous, are attached to filamentary stalks, and by these the whole compacted mass is united to the involuted spire of the shell, where it is usually concealed by the body of the parent. The descriptions, until recently admitted into the works of the most respectable naturalists, of argonauts sailing about in pretty little fleets upon the surface of the water, employing six of their tentacula as oars, and spreading out two, which are broadly expanded for the purpose, as sails to catch the breeze, are now regarded entirely as fabulous, and indeed are founded upon an entire misapprehension of the position of the animal in its shell, and of the use of the two expanded arms or *vela* (sails). The membranes of these arms are extended at the pleasure of the animal, so as to envelop the shell, and appear to be the secreting organs employed in its fabrication. Two species of A. are common in the Mediterranean.

ARGONAUTS, heroes of Greek antiquity (so named from their ship *Argo*), who, according to tradition, about a generation before the Trojan war, undertook a long voyage into unknown seas, under the command of Jason. Homer alludes to the story; Hesiod, Mimnermus, Pindar, the Pseudo-Orpheus, and many others relate it, all in different ways, the accounts in some instances being utterly irreconcilable. The plainest and most complete narrative is that of Apollodorus, which is as follows: Jason was commissioned by his uncle, Pelias—who ruled over Iolcus, in Thessaly—to fetch from the country of Æetes (Colchis) the golden fleece of the ram, which was suspended on an oak, and guarded by a sleepless dragon. He therefore caused Argus, the son of Phrixus, to build a ship of fifty oars; and, in pursuit of this adventure, gathered together the choicest heroes from all parts of Greece, fifty in number, with whom he sailed. Their first landing place was Lemnos, where the A. staid two years, because the women, in consequence of the wrath of Aphrodite, had slain all the men, excepting Thoas. Next they sailed to the Doliones, and were hospitably received by king Cizycus, who was afterwards accidentally killed by Jason. After landing at Mysia, where they left Hercules and Polyphemus—who had wandered too far inland in pursuit of the lost Hylas—they came to the country of the Bebryces, where king Amyceus was killed by Pollux, or Polydeuces, in a pugilistic fight. They next sailed along the coast of Thrace to Salmydessus, where two of their number, Zetes and Calais, having delivered the blind seer, Phineus, from certain winged monsters called Harpies, he in return gave them good counsel respecting their future adventures, and especially warned them against the dangerous passage between the opening and closing Symplegades, from which they escaped with but little injury to their vessel. The story goes that Phineus advised the A. to let loose a dove when they approached the dreaded rocks, and to judge from its fortune what they themselves might expect. The bird escaped with the loss of its tail. The A. resolved to risk the passage, and, after heroic efforts, got safely through, their ship only losing some of the ornaments of its stern. After visiting several other lands, they arrived at the mouth of the river Phasis, in Colchis. Here the king, Æetes, promised to give up the golden fleece to Jason, on condition that the latter should yoke to a plow the two fire-breathing bulls with brazen hoofs, and should sow the dragon's teeth left by Cadmus in Thebes. Jason, by the help of the famous sorceress Medea, daughter of Æetes, who had fallen passionately in love with the bold navigator, fulfilled these conditions; and was also assisted by Medea in still more wonderful exploits. He obtained from her, under promise of marriage, a charm against fire and steel, and was enabled to destroy all the warriors who sprang up from the land sown with the dragon's teeth. While this was taking place, Æetes had resolved to burn the ship *Argo*, and put to death the crew; but Jason, informed of the scheme by Medea, anticipated it, hastened into the grove, stupefied the dragon-sentinel by an opiate-charm prepared by Medea, seized the golden fleece, and, embarking in the *Argo* with his mistress and her brother Absyrtus, sailed away from Colchis by night. Æetes followed, but was hindered in his pursuit by an atrocity committed by his fierce daughter. It is said that she slew her brother Absyrtus, and cut him into several pieces, which she threw overboard, one at a time. While king Æetes staid to gather up the fragments of his

son, Jason escaped from the pursuit. The A. now reached the mouth of the river Eriadmus; but were driven on the Absyrtian islands by a storm sent from Jove, who was angry on account of the murder of Absyrtus. Meanwhile the mast of the *Argo*—which had been cut from the sacred grove of Dodona—delivered an oracle to the effect that Jove could not be appeased unless they sailed towards Ausonia, and were purified through the expiatory agency of Circe. This was accomplished; and next the A. passed by the Sirens, from whose charms they were preserved by Orpheus, who sang to them, but could not hinder one of their number, Butes, from swimming off to the sea-maidens; then through Scylla and Charybdis, by the help of Thetis, and at length landed on the island of Corcyra, where Alcinous ruled. On leaving this place, they encountered a storm at night, but were saved by Apollo, who, in flashes of lightning, revealed to them the haven of Anaphe, where they raised an altar to their preserver. At Crete, their landing was opposed by the giant Talus, who was slain by Medea. They subsequently touched at Ægina, and, sailing between Eubœa and Locris, arrived safely at Iolcus, after a four months' voyage. Jason dedicated the good ship *Argo* to Neptune, at the isthmus of Corinth.

It is perhaps useless to speculate on the real character of the Argonautic expedition, even if it be more than a mere myth. The accounts given by other writers differ so widely, especially in the geographical parts, from those of Apollodorus, that it becomes impossible to determine satisfactorily whether the expedition sailed n., e., or w. It is said that as geographical knowledge increased, the poets felt obliged to invent new homeward routes for the returning heroes, it being essential to the character of the story that its scene should be placed in unknown regions. Herodotus, Callimachus, and Diodorus Siculus agreed in representing the return route as the same pursued by them in sailing to Colchis, but Timæus, Scimnus of Chios, the Pseudo-Orpheus, and others describe the ship as making its way into the northern ocean by way of the Tanais, and thence along the northern coasts of Europe. Apollodorus, Apollonius, Rhodius, and others describe the course as through the Euxine and the rivers Ister and Eridanus into the western ocean, or the Adriatic. In Pindar's account they return through the eastern ocean. The number and the names of the Argonauts differ as well as the routes, but only one writer, the Scholiast upon Lycophron, puts the number of men as high as one hundred and fifty. The Scholiast upon Apollonius Rhodius describes the writers who had investigated the legend or had written poems on this theme. The common historical interpretation of the legend is that Jason sailed on a voyage of discovery, which had for its aim and stimulus the hope of new commercial relations; others would modify this hypothesis, and suggest that the enterprise was partly commercial, partly piratical, and partly adventurous, and that Jason's crew was in all probability composed of young, restless, and ambitious spirits, who were ready for anything that might turn up.

ARGONAUTS OF '49, a popular name for the excited and sanguine throng of fortune-seekers which emigrated to California after the news of the discovery of gold became generally known. By the close of the year 1849, 39,000 had arrived in California by sea and 42,000 by land, coming from all parts of the world. The name more appropriately attaches to those who sailed for the new El Dorado, which was almost as unknown a region as that sought by Jason and his followers. The vast body left the ports of the eastern states in the early months of 1849, some making the long voyage around Cape Horn, others proceeding by ship to Chagres, and thence by land across the isthmus to Panama, where they again embarked on any ship obtainable. Among the vessels that bore the gold-seekers, those belonging to the Pacific Mail Steamship Company were especially prominent. This company, incorporated in 1848, built three side-wheel steamers, for service between Panama and San Francisco; the first of which, the *California*, sailed from New York, Oct. 6, 1848, and reached Panama, Jan. 30, 1849, where over 400 persons embarked, although there was room for little more than 100. The *Oregon*, which arrived at Panama about the middle of March, 1849, left with 500 passengers, and the *Panama*, which arrived early in May took on board some 700. Exorbitant prices were asked for tickets even in the steerage, and even holders of tickets were in one instance obliged to pay \$100 extra for the privilege of drawing lots for steerage places. The *California* reached San Francisco on Feb. 28, 1849; the *Oregon* on April 1, and the *Panama* on June 4. Between these dates, brigs, schooners, and other vessels from ports on the Atlantic and Pacific coasts, set sail for California, crowded with passengers, most of whom were doomed to great hardships before reaching their goal. See Bancroft, *History of the Pacific States*, vol. 18; Bayard Taylor, *El Dorado*; Stillman, *The Golden Fleece*; and Bret Harte, *Tales of the Argonauts*.

ARGONNE, a rocky, tree-covered plateau in n. e. France, extending along the border of Lorraine and Champagne, and forming parts of the departments of Ardennes and Meuse. The Argonne forest proper, or western Argonne, has a length of over thirty miles and a width of from one to eight miles. The forest of eastern Argonne includes the forest of Apremont, 1225 feet in altitude. There are several passes in this region that have historical associations connected with them, such as the battlefield of Almy, the French Thermopylæ. Dumouriez called his defense of this frontier in 1793 the "Argonne campaign."

ARGOON, or ARGUN, an affluent of the Amoor river, rising in the Mongolian mountains and running n.e. through the northern part of the desert of Gobi to lake Kulon;

thence n., separating Russian from Chinese Tartary, to meet the Shilka, the two forming the Amoor.

ARGOS. See ARGOLIS.

ARGOS'TOLI, a seaport on the s.w. of Cephalonia, and capital of the island. Its lat is 38° 10' n., and long. 19° 59' e. Its pop. is 9100, and its quay is a mile long.

ARGOT, French for what the English call "slang," especially the dialect of thieves and vagabonds. Like all such tongues, A. is often sparkling with wit and remarkable for aptness and comprehensiveness of expression. Many specimens of it are to be found in Victor Hugo's *Les Misérables*, and in the lower grade of Parisian journals. The reader is referred to Barrère, *Argot and Slang* (1887), and the article SLANG.

ARGUELLES, AUGUSTIN, b. Asturias, 1776, a Spanish politician of the liberal school. On the breaking out of the war of independence in 1808, he went to Cadiz, where he agitated for the organization of a regency along with a free constitution, as the best method of strengthening and consolidating the powers and resources of the nation. In 1812, he was sent as representative of his native province to the cortes, where he was appointed one of the members of the committee to whom was intrusted the drawing up of the plan of a new constitution. His splendid talents as a public speaker soon won him the admiration of the liberal party, who used to term him the Spanish Cicero. But on the return of Ferdinand VII., A. fell a victim to the reactionary spirit which ensued. On the 10th of May, 1814, he was arrested and imprisoned; but at his trial he displayed such dexterity that it was found impossible to convict him. Different judges were nominated five successive times, but they could not agree in their decision. At last the monarch himself passed sentence, which was that A. should be confined for ten years in the prison at Ceuta. He was not, however, alone in his misfortunes. Fourteen persons were condemned along with him, amongst whom was his friend Juan Alvarez Guerra. In their confinement they experienced such barbarous treatment, that in four years three died, two became mad, and the rest received greivous injuries. The revolution of 1820 restored them to freedom. A. became minister of the interior, but soon resigned, in consequence of the king complaining of the weakness of the executive. Although provoked beyond measure by the narrow bigotry of the court, he did not rush into extremes, but continued a constitutional liberal to the end of his life. In the cortes held at Seville in 1823, he voted for the suspension of the royal power; but after the violation of the constitution he fled to England, where he remained till the amnesty of 1832. On his return to Spain, being nominated to the cortes, he was repeatedly made president and vice-president of the chamber of deputies, and always showed himself a moderate but unwavering reformer. In July, 1841, on the discussion of the law regarding the sale of church property, he delivered himself strongly against all concordats with the pope. Next to Espartero, he was the most popular man in the kingdom with the enlightened party. During the regency, he was appointed guardian to the young queen Isabella, but d. soon after, on the 23d of March, 1844, at Madrid. In his old age, he still exhibited the fiery eloquence that marked his youth.

ARGUMENT (Lat. *argumentum*), in logic, means properly the ground or premise on which a conclusion is rested; popularly, it is applied to a series of arguments, or to a controversy. *Argumentation* is reasoning put into regular shape, with a view to convince or silence an objector. Logicians have given distinctive names to various kinds of arguments. Thus, we have the *argumentum ad hominem*, which is no real proof, but only an appeal to the known prepossessions or admissions of the persons addressed. In this style, wher a man upholds one method of fraud, he may, by an appeal to his consistency, be driven to uphold another. The A. *ad veritatem*, again, has no regard to anything save objective truth. Next we have the A. *e consensu gentium*, or an appeal to the common belief of mankind, which, of course, may be used to prove or disprove anything. The A. *a tuto* rests upon the supposed safety or prudence of adopting a certain conclusion. It is sometimes used by Roman Catholics against Protestants in the following form: Protestants teach that salvation is possible in any church; this is denied by Catholics; therefore, it is safer to belong to the Catholic church, as even the Protestant admits that a man may be saved in that church. Lastly, the *argumentum a baculo* (or use of the cudgel), though objectionable, is concise in its style, and has settled many controversies.

ARGUMENTUM AD HOMINEM. See ARGUMENT, FALLACY.

ARGUS, the son of Zeus and Niobe, succeeded Phoroneus in the government of the Peloponnesus, which took from him its name of Argos, as did also the territory of Argolis.—A., surnamed Panoptes (all-seeing), had one hundred eyes, some of which were always awake. He was enormously strong, and, on account of the wonderful exploits he performed, Juno appointed him to watch over Io, transformed into a cow. Mercury being commissioned by Zeus to carry off the cow, slew A. by stoning him; or, as Ovid says, first charmed him to sleep by playing on the flute, and then beheaded him. Juno used the eyes of A. to decorate the peacock's tail.—A., the builder of the ship *Argo* (see ARGONAUTS).

ARGUS, a genus of gallinaceous birds, remarkable for magnificence of plumage. The only known species is *A. giganteus*, formerly called *phasianus* A., and still very generally the A. pheasant. The sides of the head and of the neck are destitute of feathers; the tail consists of twelve feathers, of which the two middle ones in the male are very much elongated; the secondary feathers of the wings are much longer than the primary. The name A. has allusion to the many beautiful eye-like markings which adorn the plumage of the male, and particularly the secondaries of the wings. The long secondaries are said to impede the flight of the bird; but its wings are much employed to aid it in running. The female is of comparatively tame plumage, not only wanting the eye-like markings, but even the great length of the secondaries and of the middle tail-feathers. The size of the bird, when divested of its plumage, is not much greater than that of a common barn-door fowl, but the tail-feathers of the male are nearly 4 ft. long. The A. is a native of Sumatra and other eastern islands, of the peninsula of Malacca, Siam, etc. It is said to be found even in the northern parts of China. It is impatient of confinement, and has very seldom been brought alive to Europe.

ARGYLE, ARCHIBALD CAMPBELL, Marquis of, an eminent political character of the 17th c., was b. in 1598, and succeeded to the earldom of A. in 1638. Already he had given proofs of that strength of religious principle which marked his whole life, and of a perilous union of attachment to the king and of faith in the principles against which the king made war. In the general assembly at Glasgow, in Nov., 1638, he openly took the side of the covenanters, and thenceforth became recognized as their political head. In 1640, he commanded a military expedition through Badnoch, Athole, Mar, and Angus, for the purpose of enforcing subjection to the Scottish parliament. On the king's visit to Scotland, in 1641, he found it convenient to show peculiar favor to A., and created him a marquis. On the breaking out of hostilities, A. was still desirous for negotiation, but was finally compelled to take the field. In April, 1644, he dispersed the royalist forces under the marquis of Huntly, in Aberdeenshire. He was less successful in withstanding the genius of Montrose, who, on the 2d Feb., 1645, almost annihilated his army at Inverlochy. His estates had suffered so much in the preceding year from the ravages of the brilliant cavalier, that a sum of public money was voted for his support. In Aug., 1646, he went to London, with Loudon and Dunfermline, to treat with the parliament for a mitigation of the articles presented to the king. He was at the same time the bearer of a secret commission from the king, to treat with the duke of Richmond and the marquis of Hertford, on the propriety of a Scottish demonstration in favor of Charles. On the defeat of the "engagement" plan, to which he had been decidedly opposed, the government of Scotland devolved on A. and the other Presbyterian leaders. In the parliament of Feb. 1649, Charles II. was proclaimed king, and at Scone, on the 1st of Jan., 1651, A. put the crown on his head. At this time, it was even said that the complainant monarch intended to marry one of his daughters. As head of the committee of estates, A. took vigorous measures to oppose Cromwell's invasion of Scotland, and still adhered to the king, after the subjugation of the country. After the battle of Worcester, he retired to Inverary, where he held out for a year against Cromwell's troops. Falling sick, he was taken prisoner by Gen. Dean. He refused submission to the protector, but took an engagement to live peaceably, which he strictly kept. On the restoration, he repaired to Whitehall, encouraged by a flattering letter from the king to his son. Impeached with the crime of having submitted to the usurper (to whom he had refused allegiance), he was committed to the Tower, and on the 13th Feb., 1661, was brought before the Scottish parliament on the charge of treason. He defended himself with spirit, but in vain. On the 27th May, he was executed at Edinburgh—having displayed throughout his whole trial, and on the scaffold, the dignity of a true nobleman, and the meekness of a Christian.

His son, ARCHIBALD, 9th Earl of A., was early distinguished by personal accomplishments, and exhibited great bravery on the disastrous day of Dunbar, where he commanded a regiment on the royal side. After Worcester, he continued, like his father, in arms, and made himself so obnoxious to the parliamentary leaders, that he was specially excepted by Cromwell from the act of grace in 1654. After much harassing persecution, he submitted to the parliament, but continued to be closely watched. On the restoration of Charles II., he was received into high favor (as a balance to the execution of his father), and, unfortunately for his own fame, participated in some of the iniquitous acts of the Scottish legislature. He had, however, numerous and active enemies; and, on the ground of an intercepted letter, in which he had complained of neglect, he was tried and condemned to death by the Scottish parliament for the imaginary crime of *lesae majestatis*. The influence of Clarendon restored him to liberty and favor; even the king himself was prejudiced in his favor; but his explanation in subscribing the infamous test framed by the Scottish parliament in 1681 was declared treasonable, and he was again condemned to death. The devotion of his wife enabled him to escape from Edinburgh castle in the disguise of a page; and after remaining concealed some time, he fled to Holland. Landing in the north of Scotland, in May, 1685, with an armed force, to co-operate in the revolt of Monmouth, he was, after a series of misfortunes, taken prisoner, hastily condemned, and beheaded, June 30, 1685. His son Archibald, one of the deputation sent by the Scottish convention to present the crown to the prince of Orange, was in 1701 created duke of Argyle.

ARGYLE, GEORGE JOHN DOUGLAS CAMPBELL, 8th duke of A., was b. in 1828, and succeeded his father in 1847. At the age of 19, his grace, then marquis of Lorne, wrote a pamphlet entitled *A Letter to the Peers from a Peer's Son*, on the subject of the struggle which ended in the disruption of the Scottish church. Seven years later he published an essay on presbytery, which contains a historical vindication of the presbyterian system. On taking his seat in the house of peers, he soon commanded the respect of that dignified assembly. On the formation of the coalition ministry by lord Aberdeen, his grace was invested with the office of lord privy seal, which he continued to hold in lord Palmerston's administration. In 1855, he relinquished his office, and became post-master general. In 1859, on Palmerston's return, he again accepted the office. He was secretary of state for India in 1868 and again in 1881; he resigned office in 1881, disapproving the Irish land bill. In 1874, he had supported the abolition of patronage in the church of Scotland. In 1854, he was chosen lord rector of the university of Glasgow; in 1855 presided at a meeting of the British Association in that city; and in 1861 was elected president of the Royal Society of Edinburgh. His grace is hereditary master of the queen's household in Scotland, chancellor of the university of St. Andrews, a trustee of the British Museum, also hereditary sheriff and lord-lieutenant of Argyleshire. Besides numerous papers on zoology, geology, etc., he has written *The Reign of Love*, 1866; *Primeval Man*, 1869; *A History of the Antiquities of Iona*, (1870), and a volume of poems, *The Burdens of Belief*, 1894. In 1844 he married the eldest daughter of the duke of Sutherland (d. 1878), and in 1895, his cousin Ina Erskine McNeill. His eldest son is the marquis of Lorne. In the ducal title, A. is now generally spelt Argyll.

ARGYLE, JOHN CAMPBELL, 2d Duke of, son of the first duke, was b. in 1678, and took an important part in the political and military affairs of his time. As royal commissioner in 1705, he had a principal share in bringing about the act of union. As a soldier, he distinguished himself under Marlborough at Ramilies, Oudenarde, Lille, Ghent, and Malplaquet. Previous to the change of ministry in 1710, A. had been a keen whig. He now veered with the wind of the court, and became a declaimer against the duke of Marlborough. As the reward of his apostasy, he was appointed by the tories generalissimo of the British army in Spain; but considering himself to have been unhand-somely treated by the ministry, he shortly after returned, and finding his influence greatly diminished, he again became a whig. His career up to the rebellion of 1715 was most tortuous and unprincipled, and seriously detracts from his meritorious services during that critical period. He was, however, completely successful in quelling disturbances, and his services were rewarded in 1718, among other dignities, with an English peerage, and the title of duke of Greenwich. His restless vanity and ambition, however, constantly prompted him to political intrigues. In 1721, he again played into the hands of the tories, for the purpose of securing the entire patronage of Scotland. In 1737, he rose into immense popularity in his own country, by his spirited defense before parliament of the city of Edinburgh in regard to the Porteous mob. He d. on the 3d Sept., 1743. He was a man of lax principles and selfish character, but possessed of considerable shrewdness and talent, and noted for his kindness and courtesy in private life. The benevolence of his disposition procured him the title of "the good duke of Argyle."

ARGYLESIRE (*Airer-Gaedhil*, territory of the Gael), a co. in the w. of Scotland, cut up into many peninsulas by arms of the sea, and including numerous islands. It is bounded n. by Inverness-shire; w and s. by the sea; e. by Perthshire, Dumbarton, Loch Long, and Firth of Clyde. Its greatest length is about 115 m.; greatest breadth, about 55 m.; its extent of coast-line is very great, amounting to 2289 m., owing to the indentation of the coast by numerous lochs running inland. Next to Inverness, it is the largest co. in Scotland—area, 3210 sq. m., of which 623 are occupied by the numerous islands. No part is above 12 m. from the sea or from large inland lochs. The co. is divided into the districts of Cantire, north and south Argyle, Lorn, Appin, Cowal, Morven, and Sunart. The chief islands are Mull, Islay, Jura, Tiree, Coll, Lismore, and Colonsay, with Iona and Staffa. There are upwards of thirty other islands of smaller size. The general aspect of A. is wild and picturesque, marked by rugged and lofty mountains and deep inland bays. Some fertile valleys exist. The north part is entirely mountainous, and presents some of the grandest scenery in Scotland, as Glencoe. The highest peaks are (Ord. Trig. Survey) Bidean nam Bian, 3766 ft.; Ben Cruachan, 3693; Buachael Etive, 3341—all in Lorn; Ben Ima (end of Loch Long), 3319; Ben More (Mull), 3185; Ben Creach (Morven), 2790; North Pap of Jura, 2565. The chief bays are (going south)—Loch Moidart, Loch Sunart, Linnhe Loch, branching off into Loch Eil and Loch Leven, Loch Fyne, and Loch Long. There are no rivers of any size. The streams are short and rapid, the principal being the Urchay, running through Glenorchy into Loch Awe, and the awe connecting that lake with Loch Etive. The inland or fresh-water lochs are Loch Awe and Loch Lydoch. The rocks of A. are mica-slate, which predominates on the main-land; trap in Mull and Lorn; quartz rock in Islay and Jura; granite around Loch Etive and in Knapdale; patches of lias and oolite in many of the isles; and a little old red sand-stone w. of Loch Fyne and in South Cantire. Lead-mines occur at Strontian (where the mineral strontianite was discovered, and from which the names of the earth called *strontia* and the metal *strontium* are derived), at Tyndrum, and in Islay and Coll. A copper-mine exists in Islay. The Easdale and Ballachulish quarries supply the best

roofing-slates in Scotland. Coal occurs near Campbelton; fine marble in Tiree, etc.; excellent granite near Inverary; and limestone in most parts of the county. The fertile parts of A. lie along the arms of the sea and the mountain streams. The soil is mostly light, sandy, and gravelly loam along the coast and the sides of rivers, and gravelly, with a till bottom, on the hillsides. Sheep and cattle rearing are the chief occupations of the farmer. More sheep are reared in A. than in any other Scotch co., and nearly a million acres are in permanent pasture. In number of cattle, A. yields only to the counties of Aberdeen, Ayr, Lanark, and Perth. A. abounds in deer and game. Loch Fyne is famed for its herrings. Loch Awe abounds in salmon and trout.

In many parts of A. the peasantry are still very poor, notwithstanding that steamers now connect every portion of the coast with the commercial center of Scotland. The manufactures are unimportant, the chief being whisky, in Campbelton and Islay, and coarse woollens for home use. The chief towns and villages are Inverary, Campbelton, Oban, Dunoon, Appin, Lochgilphead, and Tarbert. The three former unite with Ayr and Irvine in returning one member to parliament; the co. returns another. Pop. in '91, 75,003 represented as mostly using the Gaelic language. This exhibits a considerable decrease since 1831, which has chiefly resulted from emigration. This extensive county is divided ecclesiastically into not more than fifty parishes, which contain only two royal burghs, Iverary and Campbelton, the former of which is a station of the circuit court of judiciary. The principal proprietors are the duke of Argyle, the head, and the earl of Breadalbane, a branch of the Campbell family. Among the antiquities of A. are the ruins of Iona and Oronsay, and many *duns*, or circular forts along the coast. In Cantire formerly lived the Macdonalds, or lords of the isles, whose power was weakened by James III.

ARIA (AIR), in music, a rhythmical song, as distinct from recitative. The term was formerly applied to a measured lyrical piece either for one or several voices; but is now commonly applied to a song introduced in a cantata, oratorio, or opera, and intended for one voice supported by instruments. **ARIETTA**, a short melody. **ARIOSO**, a passage in the style of the A., often introduced into recitative. **A. BUFFO**, a comic song, etc.

ARIADNE, a daughter of Minos, king of Crete, by Pasiphaë. When Theseus, with the offerings of the Athenians for the Minotaur, landed in Crete, A. conceived a passion for the beautiful stranger, and gave him a clew by means of which he threaded the mazes of the labyrinth, and was enabled to slay the monster. For this service, Theseus promised to marry her, and she escaped with him, but was slain by Diana on the island of Naxos.—According to another tradition, A. was left by Theseus at Naxos, where she was found by Bacchus returning from his triumph in India, who was captivated by her beauty, and married her. At her death, he gave her a place among the gods, and suspended her wedding-crown as a constellation in the sky. A., as left forsaken by Theseus, and as married to Bacchus, has been a favorite subject with artists.

ARIALDUS, a deacon of the church of Milan, who flourished during the 11th century. He took a prominent part in the ecclesiastical contentions of his times. The Catholic church in the n. of Italy was then very corrupt, a wide-spread licentiousness, originating from the unnatural institution of priestly celibacy, prevailed. Great numbers of the clergy kept concubines openly. Such as looked earnestly in those days at this flagrant evil, were disposed to consider the strict enforcement of celibacy the only effectual cure. Chief among these reformers stood A., whose life was one continued scene of violent controversy. Although successively sanctioned by popes Stephen X., Nicholas II., and Alexander II., he found little sympathy among his brethren, and used to complain that he could only get laymen to assist him in his agitation. Having at length succeeded in obtaining a papal bull of excommunication against the archbishop of Milan, a fierce tumult ensued in the city, whose inhabitants declared against A. and his coadjutors. A. now fled to the country; but his hiding-place being betrayed, he was conveyed captive to a desert isle in lake Maggiore, where he was murdered by the emissaries of the archbishop, and his remains thrown into the lake, June 28, 1065. He was afterwards canonized by pope Alexander II.

ARIANA. See **ARYAN RACE**.

ARIANO, *Arianum*, a city of south Italy, in the province of Avellino, beautifully situated 2800 ft. above the sea, in one of the most frequented passes of the Apennines, 50 m. n.e. from Naples. It is a bishop's seat, and has a fine cathedral. The chief manufacture is earthenware. There is a considerable export trade in wine and in butter. A. is said to have been founded by Diomed. Roger II. held a parliament here to settle the affairs of the province, after his defeat of the allied armies of pope Innocent II. and the prince of Capua. In the face of the hill on which the city is built, hundreds of caves have been dug, in which many of the poorer inhabitants dwell. Pop. '81, 14,398.

A'RIANS. See **ARIUS**, **HERESY**, **HERETICS**.

ARIAS MONTANUS, **BENEDICTUS**, a Catholic divine noted for his great linguistic attainments, was b. 1527, in the village of Frexenal de la Sierra, situated amongst the mountains separating Estremadura from Andalusia. He studied first at Seville, and

afterwards at Alcalá de Henares, where he distinguished himself by the ardor he manifested in the acquisition of the oriental languages, Arabic, Syriac, and Chaldee. He next proceeded on a tour through Italy, France, Germany, England, and the Netherlands, in the course of which he obtained a knowledge of various modern tongues. He was present at the celebrated council of Trent; but on his return to his own country, he resolved to retire into seclusion, and dedicate his whole time to literature. In 1568, however, Philip II. persuaded him to repair to Antwerp and superintend the publication of the famous edition of the "Polyglot Bible," executed in that city at the suggestion of the printer, Christopher Plantin. After four years' labor, the work was issued under the title *Biblia Sacra, Hebraice Chaldaice, Græce et Latine, Philippi II. Regis Catholici Pietate et Studio ad Sacrosanctæ Ecclesiæ Usus Chph. Plantinus excudebat*. It was received with universal applause. The Jesuits, to whom A. was sincerely and strenuously opposed, alone attempted to fasten the charge of heresy on the author, who made several journeys to Rome to clear himself of the accusation. Philip II. rewarded him with a pension of 2000 ducats, besides bestowing on him various other emoluments. He d. at Seville in 1598. His literary works are very numerous. They relate principally to the Bible and to Jewish antiquities; but he also wrote a poem on rhetoric, and a history of nature.

ARICA, a seaport of Tacna, a northerly department of Chili, is in lat. $18^{\circ} 28'$ s., and long. $70^{\circ} 24'$ w. Though it has merely a roadstead, it affords safe anchorage to shipping, and is one of the chief outlets of the trade of Bolivia, being connected with La Paz in that republic by a mule-path which leads across the west Cordillera of the Andes. Its exports mostly consist of copper, silver, alpaca, wool, and guano. A. has frequently suffered from earthquakes; a most destructive one occurred in 1868. In 1880 the Chilians took it from Peru, acquiring by the treaty of 1884 the right to the department of Tacna for ten years. At the end of that time it was to be decided by popular vote to whom it belonged, but the decision was postponed. Pop. about 4000.

ARICHAT, a seaport of Cape Breton island, in the province of Nova Scotia, with a harbor for the largest vessels. It is near the Gut of Canso, the most southerly of three channels of communication between the gulf of St. Lawrence and the Atlantic. The t. has about 1000 inhabitants, is largely engaged in fishing, and at the head of its harbor a lead-mine has recently been opened.

ARICKAREES. See RICKAREES.

ARIÈGE, or **ARRIÈGE**, a river in the s. of France, rises in the department of the east Pyrenees, flows through a beautiful vale, and falls into the Garonne near Toulouse.—The department of **ARIÈGE**, which lies along the northern slopes of the Pyrenees, formed a part of the old co. of Foix, the territory of Couserans, and the province of Languedoc, is bounded n. and w. by Haute Garonne, e. by Aude, s. by the republic of Andorra and the Pyrenees. It contains some of the highest mountain-summits in France, such as Fontargente, 9164 ft.; Serrère, 9592 ft.; Montcalm, 10,513 ft.; Estats, 10,611 ft.; Montvalier, 9120 ft. The department, nevertheless, has a mild climate. Area, 1890 sq. m. Pop. '91, 227,491, engaged chiefly in agriculture, pasturage, iron-mines, and the manufacture of woollens, linen, pottery, etc. The three arrondissements are Foix, Pamiers, and St. Girons. Chief towns, Foix, Pamiers, St. Girons.

ARIEL, used by Isaiah as a proper name, which he applies to Jerusalem, as "victorious under God." In Shakespeare's *Tempest*, A. is a spirit of the air, in the service of the magician "Prospero."

ARIES, the Ram, one of the signs of the zodiac, including the first 30 degrees of the ecliptic measured from the vernal equinox, or that point where the vernal passage of the sun across the equator takes place. The vernal equinox, or, as it is also called, the first point of A., is constantly changing its position among the fixed stars, in consequence of the precession of the equinoxes, moving westward at the rate of $50''.2$ annually. It is from this circumstance that the sign A. no longer corresponds with the constellation A., which was the case about 2000 years ago, when the ecliptic was divided into 12 equal parts called signs, each named after the group of stars through which it passed. The present sign A. is the constellation Pisces, about 30° w. of the original sign; and although the sun at the vernal equinox will always be at the first point of A., yet nearly 24,000 years will elapse before that point will again coincide with the beginning of the constellation A.

ARIL, *Arillus*, a peculiar covering of the seed in some plants, formed by an expansion of the *funiculus* (the cord which attaches the ovule to the *placenta*), or of the *placenta* itself. This expansion takes place after fertilization, and sometimes invests the seed entirely, sometimes only partially. In the nutmeg, the A. forms what is called *mace*. In the spindle-tree (*euonymus europæus*) it forms the remarkable orange-colored covering of the seed.

ARINO'RI MORI. See MORI, ARINORI.

ARINOS, a river of Brazil, which, after a n.w. course of 700 m., enters the Tapajos, itself an affluent of the Amazon, in lat. $9^{\circ} 30'$ s., and long. $58^{\circ} 20'$ w.

ARION, a celebrated lute-player, a native of Methymna, in Lesbos, about 700 B.C., was regarded by the ancients as the inventor of the dithyrambic meter. According to a tradition first given by Herodotus, and afterwards decorated by the poets, A. was sent

by Periander, ruler of Corinth, to Sicily and Italy, and at Tarentum won the prize in a poetical contest. As he returned laden with gifts in a Corinthian ship, the avaricious mariners determined to slay him and seize his wealth; of this the poet-musician was forewarned by Apollo in a dream. He asked for permission to try his skill in music; and after playing on his lute, threw himself from the deck into the sea. Here several dolphins, charmed by his music, had assembled round the vessel. On the back of one of them the musician rode safely to the promontory of Tienarus, where he landed, and journeyed on to Corinth. The sailors who, arriving afterwards, assured Periander that A. was dead, were confronted with him, when they confessed their guilt, and were crucified. The lute and dolphin were raised among the constellations; and the story became a favorite theme with artists. A. W. Schlegel, in one of his best poems, gives this story of A.

ARIOS'TO, LUDOVICO, one of the greatest of Italian poets, was b. at Reggio, Sept. 8, 1474, being the eldest son of the military governor of that city. He was bred to the law, but abandoned it for poetry. However, at an early period of life, he was compelled to exert himself for the support of a large family, left as a burden on him at the death of his father. His imaginative powers were developed in early life. In 1503, after he had written two comedies, with several lyrical poems in Latin and Italian, he was introduced to the court of the cardinal Hippolytus d'Este, who employed him in many negotiations. Here, in Ferrara, in the space of about 10 years, he produced his great poem *Orlando Furioso*, which was published in that city, in 1 vol. 4to, in 1516, in 40 cantos. After the death of the cardinal, the duke, his brother, invited the poet to his service, and acted to him with great kindness and liberality. In the early part of 1521, a second edition of his poems was published, the *Orlando Furioso* being still in 40 cantos. Shortly after, he was commissioned by the duke to suppress an insurrection which had broken out in the wild mountain-district of Garfagnana; a task which seems more like a punishment than a mark of honor. A., however, succeeded in this arduous undertaking; and after remaining three years governor of the quarter, he returned to Ferrara, where he lived comfortably, nominally in the service of his patron, but in reality enjoying what he highly prized—an abundant leisure for prosecuting his studies. It was at this time that he composed his comedies, and gave the finishing touch to his *Orlando*. At length, in the latter part of 1532, that poem made its appearance in a third edition, enlarged to its present dimensions of 46 cantos. He now became seriously ill of a painful internal distemper, of which, after a few months of suffering, he d. on the 6th of June, 1533, in his 59th year, and was buried in the church of San Benedetto, at Ferrara, where a magnificent monument indicates the resting-place of his remains. A. is described as a man of noble personal appearance and amiable character. His *Orlando Furioso* is a romantic, imaginative epic, marked by great vivacity, playfulness of fancy, and ingenuity in the linking together of the several episodes. It takes its name and its theme from a chivalrous romantic poem by Boiardo, the *Orlando Innamorato*. That poem treats of the wars between Charlemagne and the Saracens, confounded as they were by tradition with those of Charles Martel, wherein Orlando, or Roland, stood forward as the champion of Christendom. Orlando is the hero of Boiardo's piece, and falls in love with Angelica, a clever and beautiful oriental princess, sent by the Paynim to sow discord among the knights of the Christian armies. The story of this lady being left unfinished in the *Orlando Innamorato* is taken up by A., who makes her fall in love herself with an obscure juvenile squire, on which Orlando gets furious, and long continues in a state of insanity. Besides his great work, A. wrote comedies, satires, sonnets, and a number of Latin poems, all more or less marked with the impress of his genius. In 1845, Giamperi, a librarian of Florence, announced that he had discovered at Argenta, near Ferrara, an autograph manuscript by A., containing a second epic, *Rinaldo Ardito*, describing, like the *Orlando*, the battles of Charlemagne and his paladins against the Saracens. The manuscript had been mutilated, and contained in a complete form only the cantos 3, 4, 5, while 2 and 6 were imperfect; and it was stated that the entire poem had consisted of 12 cantos. The work was published under the title *Rinaldo Ardito di L. Ariosto, Frammenti Inediti Pubblicati sul Manoscritto Originale*, Florence, 1846. In genius and style, it has been found by critics by no means to accord with the *Orlando*. Of the *Orlando* there are three several translations into the English language: the first, by Sir John Harrington, appeared in the year 1634; the second, by John Hoole, in 1783; and the third, by W. Stewart Rose, in 1823 and following years. In the last only is there to be found a fair representation of the feeling and spirit of the original.

ARIOVIS'TUS (probably the Latinized form of the German *Heer-fürst*, army-prince), a German chief, leader of the Marcomanni and other German tribes, was requested by the Sequani, a Gallic people, to assist them in a contest against the Ædui. Having gained a victory for the Sequani, A. was so well pleased with their fine country (now Burgundy), that he and his followers determined to abide there. Many other Germans followed him into Gaul, where he soon collected an army of 120,000 men. The Gallic people turned now for help towards the Romans, and Cæsar demanded an interview with A., who proudly replied, that "he did not see what Cæsar had to do with Gaul." After another message from Cæsar had been treated in the same scornful manner, the Roman forces under Cæsar advanced and occupied Vesontium (now Besançon), the chief city

of the Sequani. A furious engagement took place (58 B.C.), in which Roman discipline prevailed over the German forces, which were utterly routed. A., with only a few followers, escaped over the Rhine into his own country. His subsequent history is unknown.

ARISPE', a t. in Sonora, the extreme n.w. department of the Mexican confederation. It is situated in the Sierra Madre, the western range of the Rocky Mountains, on the banks of the Sonora, which is said to lose itself in an inland lake. Its pop. is estimated at 2000. The surrounding district abounds in the precious metals, as also in cotton, wine, grain, and live stock.

ARISTA and **ARIS'TATE**. See **AWN**.

ARISTA, **MARIANO**, 1802-55, a Mexican general. He commanded at the battle of Palo Alto, May 8, 1846, and was defeated by the Americans under Gen. Taylor. In 1848, he was minister of war, and two years later president of Mexico. In 1853, Santa Anna led a successful revolution, as the result of which A. was deposed and banished.

ARISTE'US (from a Greek word signifying *the best*), an ancient divinity whose worship in the earliest times was widely diffused throughout Greece, but whose myth is remarkably obscure. According to the common tradition, he was the son of Apollo and Cyrene, the latter the granddaughter of Peneius, a river-god of Thessaly. She is said to have given birth to A. on the coast of Libya, in Africa, whence the region is alleged to have derived its name of Cyrenaica. Hermes placed the child under the protection of the Horæ, the fosterers of cities, culture, and education. According to another tradition, A. was the son of the nymph Melissa, who fed the infant with nectar and ambrosia, and afterwards intrusted his education to Chiron. The great diversities in the legend were probably caused by the fusion into one of separate local divinities, whose functions were similar, and whose histories were, in consequence, carelessly commingled. After A. left Libya, he went to Thebes, in Boeotia, where he was taught by the muses the arts of healing and prophecy, and where he married Autonoe, the daughter of Cadmus, by whom he had several children. After the unfortunate death of his son Actæon (q. v.), he went to Cæos, where he liberated the inhabitants from the miseries of a destructive drought by erecting an altar to Zeus *Icmaeus*—i.e., the rain-maker. He now returned to his native land; but shortly after set out a second time on a voyage of beneficence. He visited the islands of the Ægean sea, Sicily, Sardinia, and Magna Græcia, leaving everywhere traces of his divine benignity. At last he went to Thrace, where he was initiated in the mysteries of Dionysus; and after a brief residence in the vicinity of Mt. Hæmus, he disappeared from the earth.

This myth is one of an extremely pleasing character, from the invariable beneficence which is attributed to A. It is less disfigured by anthropopathic errors than most of the myths of Greek divinities. A. was especially worshiped as the protector of vine and olive plantations, and of hunters and herdsmen. He also trained men to keep beehives, and averted the burning heats of the sun from the open fields. Later mythology often identified A. with the higher gods Zeus, Apollo, Dionysus.

ARISTARCHUS OF **SAMOS**, a celebrated ancient astronomer, of the Alexandrian school, who flourished 281-264 B.C. All his writings have perished, excepting a short essay on the sizes and distances of the sun and the moon. In this he shows the method of estimating the relative distances of the sun and the moon from the earth, by the angle formed by the two bodies at the observer's eye at that moment when the moon is exactly half luminous. It will be obvious from a glance at the annexed figure that the three bodies must then form a right-angled triangle, of which the moon is at the right angle. The angle MES, then, being observed, it is easy to find the ratio between EM and ES. This is quite correct in theory; but the impossibility of determining when the moon is exactly half illuminated, renders the method useless in practice. Besides, in the days of A., there were no instruments for measuring angles with anything like accuracy. A. estimated the angle at E at 83°, and determined EM to be $\frac{1}{10}$ of ES; the truth being that the angle at E differs only by a fraction of a minute from a right angle, and that EM, the distance of the moon from the earth, is about $\frac{1}{108}$ of ES, the distance of the sun. According to some accounts, A. held, with the Pythagorean school, that the earth moves round the sun; but this seems to be a mistake. Vitruvius speaks of A. as the inventor of a kind of concave sun-dial.



ARISTARCHUS OF **SAMOTHRACE**, a grammarian, who lived, about 150 B.C., in Alexandria, where he founded a school of grammar and criticism, and educated the children of Ptolemy Philopator. His life was chiefly devoted to the elucidation and restoration of the text of the Greek poets, especially of Homer. The form in which we now have the Homeric poems preserved is in a great measure owing to his judgment and industry. The strictness of his critical principles has made his name a general term for a severely just and judicious critic. Being afflicted with an incurable dropsy, he ended his life by voluntary starvation at the age of 72. The fragments of his writings that have been preserved are to be found scattered through the scholia on Homer, first published by Villoison (Venice, 1788).

ARISTEAS, an entirely fabulous character, who may be styled "the wandering Jew" of popular tradition in ancient Greece. First we find A. teaching Homer; then, some ages afterwards, b. at Proconnesus, an island in the sea of Marmora. It is stated that having visited the Arimaspeæ, the gold-watching griffin, and the Hyperboreans, he died on his return home; but, soon afterwards, a traveler asserted that he had been met and accosted by A. Consequently, neighbors searched the house where the body of A. was supposed to be lying, but it could not be found. Seven years afterwards he appeared as an author, and wrote a poem entitled *Arimaspeia*, in three books, giving accounts of northern and central Asia, which were copied by Herodotus and others. After thus establishing himself as a poet, he vanished again; and after 340 years of mystery, reappeared at Metapontum, in the s. of Italy, where he advised the people to erect an altar to Apollo, and an altar to "the everlasting A.," assuring them that, when Apollo founded their city, he (A.), in the form of a raven, had accompanied the god, and had assisted in the ceremony. In the early controversy of the Christian church, heathens sometimes quoted this tale of A. as a counterpart to the miracles recorded in the New Testament.

ARISTIDES, surnamed "THE JUST," was the son of Lysimachus, and descended from one of the best families in Athens. He was one of the ten leaders of the Athenians against the Persians at the battle of Marathon (490 B.C.). It had been arranged that each leader (or *strategos*) should hold the supreme command for one day; but A., who saw the folly of this want of unity, induced his companions to give up their claims, and make Miltiades commander-in-chief, which proved the means of winning the battle. In the following year A. was chief archon, and in this position, as in every other, secured the general respect of the citizens. Some years later, probably because he had opposed the plans of Themistocles, that unscrupulous leader brought about the banishment of A. It is said that when an illiterate citizen, who did not know him personally, requested him to write his own name on the voting shell, he asked the man whether A. had injured him. "No," said the voter; "but I am weary of hearing him always styled 'the Just.'" A. submitted to the sentence with dignity, praying to the gods, as he left the city, that the Athenians might not have cause to repent of their decision. Only three years later, Xerxes, with an overwhelming force, had invaded Greece. A., hearing that the Greek fleet was surrounded by that of the Persians, hastened from Ægina to apprise Themistocles of the danger, and offer his aid. After taking a prominent part in the battle of Salamis, A. was restored to popular favor, and soon afterwards aided greatly in achieving the victory at Platæa, in which he commanded the Athenians. In 477 B.C., he introduced a change in the constitution, by which all citizens, without distinction of rank, were admitted to political offices. As showing the confidence reposed in A., it is related that Themistocles having announced that he had a scheme very advantageous for Athens, but which he could not disclose in a public assembly, A. was deputed to consult with Themistocles on the subject. The plan was to secure the naval supremacy of Athens by burning all the vessels of the other Greek states, her allies, then lying in a neighboring harbor. A. reported to the people that nothing could be more advantageous than the plan of Themistocles, but nothing could be more unjust; and the matter was immediately rejected by the people. After a variety of other public services, A. died in old age, and universally respected, 468 B.C., so poor that it is said his funeral had to be provided for by the public. He left a son and two daughters, for whom provision was made by state bounty.

ARISTIDES, **ÆLIUS**, surnamed **THEODORUS**, a Greek rhetorician, b. about 117 A.D. son of a priest of Zeus. He had a natural taste for rhetoric and public speaking, and won such renown for eloquence in Greece, Italy, Egypt, and Asia, that monuments were erected to him in several cities. He is said to have been very vain of his attainments in oratory. For 13 years he was afflicted with some strange nervous disease, apparently hypnotism, or nervous sleep, something like mesmerism. When Smyrna was destroyed by an earthquake, in 178, A. was living there, and wrote to the emperor Aurelius an eloquent account of the catastrophe; the emperor responded with substantial aid for the sufferers, and for this the grateful Smyrnæans called Aristides the founder of the city, and erected to him a bronze statue. The only personal honor which he would receive was the appointment of priest of Esculapius, which office he held until his death about 189 A.D. His works extant consist of orations and declamations, which show no great power, and two treatises on rhetoric.

ARISTIDES OF **THEBES**, a Greek painter in the time of Apelles, about the middle of the 4th c. B.C., and brother of Nicomachus, who was one of his teachers. He was noted for power of expression in his work, one of his finest pictures being that of a babe approaching the breast of its mother who was mortally wounded, and whose face shows her fear lest the child should find blood instead of milk. His works were bought at enormous prices, and one of them was the first foreign painting ever exhibited to the public in Rome. He left two sons, Nicerus and Ariston, to whom he taught his art.

ARISTIPPUS, the founder of the Cyrenaic school of philosophy among the Greeks, was the son of Aritades, a wealthy gentleman of Cyrene, in Africa, and was b. in that city about the year 424 B.C. Having come over to Greece to attend the Olympic games, he heard so much of Socrates, that he was filled with an eager desire to see the sage, and

hurried to Athens, where he became one of his pupils. He remained with Socrates up nearly to the last moments of the great teacher, though he does not at any period seem to have followed his doctrines or his practice. We know that subsequently he was the object of strong dislike, both to Plato and to Antisthenes, the stoic. He passed a considerable part of his life in Syracuse, at the court of Dionysius, the tyrant, where he acquired the reputation of a philosophic voluptuary. That his manners must have been at once extremely graceful and accommodating, is clear from the saying of his opponent, Plato, who declared that "A. was the only man he knew who could wear with equal grace both fine clothes and rags." Diogenes Laertius records a number of his *dicta*, some of which take the form of *bons-mots*, and indicate a sharp, cutting, lively, and self-complaisant nature. A. also lived at Corinth, in intimacy with the famous courtesan Laïs, but towards the close of his life, he is supposed to have retired to Cyrene. His daughter Arete seems to have been a person of superior abilities, inasmuch as her father imparted his leading doctrines to her, and she to her son, A. the younger (hence called *Metrodidaktos*, "taught by the mother"), by whom they are supposed to have been systematized. A., in all probability, published nothing during his life. He prided himself more upon spending his days in what he conceived to be a philosophical manner, than in elaborating a philosophical system for the benefit of the race.

The Cyrenaic school, all the teachers of which were probably imbued with the spirit of A. and merely carried out his doctrines to their legitimate results, professed a great contempt for speculative philosophy, and for physical and mathematical knowledge. They confined their investigations to morals, and formed an ethical system completely in harmony with the gay, self-possessed, worldly, and skeptical character of their master. The chief points of the Cyrenaic system were: 1. That all human sensations are either pleasurable or painful, and that pleasure and pain are the only criterions of good and bad. 2. That pleasure consists in a gentle, and pain in a violent motion of the soul. 3. That happiness is simply the result of a continuous series of pleasurable sensations. 4. That actions are in themselves morally indifferent, and that men are concerned only with their results. Wieland in his historico-philosophical romance, *Aristipp und einige seiner Zeitgenossen* (A. and Some of his Contemporaries), presents us with a charming picture of the life and opinions of the great philosophical sensualist, who stood out in strong relief against the gloom and austerity of Antisthenes and the cynical school. See Wendt's *De Philosophiâ Cyrenaicâ* (Gött. 1842).

ARISTOBULUS, an Alexandrian Jew who lived under Ptolemæus Philometer about 175 B.C., and was considered by the early fathers as the founder of the Jewish philosophy in Alexandria. He was long considered the author of the *Exegetical Commentaries on the Books of Moses* which went under his name, but it is now admitted that the work in question was the composition of a later period. Only fragments of it remain. It was intended to show that the oldest Greek writers borrowed from the Hebrew Scriptures; and to support this theory, numerous quotations were professedly taken from Linus, Musæus, Orpheus, etc., of which the Christian apologists made abundant use. These, however, have long been considered forgeries, inasmuch as they do not exhibit a trace of the antique Greek spirit, but make the writers speak in the tone and style of the Old Testament. See Valckenær's treatise, *De Aristobulo Judæo* (Leyden, 1806).

ARISTOBULUS I., Prince of Judea, succeeded his father, John Hyrcanus, in 106 B.C. The son took the title of king, the first instance of its assumption among the Jews after the Babylonian captivity. He murdered his mother, to whom his father's will left the government, and imprisoned all but one of his brothers, and this one at a later period was put out of the way through the influence of Salome, the queen. During his reign he subdued the Iturians and compelled them to adopt Jewish laws. It is supposed that the death of A. was hastened by remorse for the crimes which he had committed.

ARISTOBULUS OF CASSANDRIA, probably the same with the Greek historian A., 330 B.C.; one of the companions of Alexander the Great, whom he accompanied in his Asiatic expeditions. He did not write his history until he was 84 years old, and he died at 90. Subsequent historians, Arrian particularly, made free use of Aristobulus's work.

ARISTOCRACY (Gr. *aristocratia*, from *aristos*, best, and *kratos*, power) means etymologically the power or government of the best, noblest, or most worthy; and in the sense which it originally bore, A. had reference not to a social class, but to a form of government in which the sovereignty was placed in the hands of a minority of the citizens of the state, exclusive altogether of the slave population, which generally existed in antiquity. It is in this sense also that we use it when we speak of the Italian states of the middle ages as aristocracies. In order to constitute an A., it was further necessary that the minority which composed it should consist of the highest class, in point not of wealth alone, but of birth and culture; the government of a minority in numbers simply, being known by the more odious name of an *oligarchy*. Were the whole government of England intrusted to the house of lords, even though that body were to become vastly more numerous than it is, so long as it did not include half of the whole adult males, and were not elective, but hereditary, England would be ruled by an A., and its rulers would be aristocrats actually. In this, its political sense, the term A. has never

been acclimatized in England, because the thing which it signifies has always been unknown. The territorial nobility, though possessing great influence in the government of the country, has, at every stage of its career, been controlled either by the crown from above or the commons from below; and thus it is that, though more important as a social influence than in any other country, the English A. has never assumed the form of a ruling-class. When used with reference to English society, the term A. has two significations—a narrower and a wider one. According to the first, it is nearly synonymous with *nobility*. In this sense, it will be treated of under that head, and its relative subdivisions. According to the second, it is synonymous with *gentry*, and includes the whole body of the people, titled and untitled, above a certain very indefinite social line. Perhaps the nearest approximation which we shall make to a definition of A. in this, its proper English sense, will be by adopting that which Aristotle has given not of *aristocratia*, but of *eugeneia*, or good birth. "Good birth," he says, "is ancient (long inherited) wealth and virtue." (*Politie*. lib. iv. c. 7.) The question as to the extent to which either of these qualities is requisite to constitute a claim to admission into the ranks of the A., is one to which probably not two persons, either within or without the pale, would return the same answer; but that the absence of either would be a ground of exclusion, is a point on which there will be little difference of opinion. No amount of mere wealth will, in general confer it either on a tradesman or his immediate descendants (see GENTLEMAN); and scarcely any deeds, however noble, will give it to him who is not the possessor of inherited fortune. Neither Burns the gauger, nor Shaw the life-guardsmen, has ever been regarded as an aristocrat, though nobody denies that the one was a poet, and the other a hero. But when the claim to recognition as an aristocrat has been inherited, it will scarcely be lost by the individual himself, however adverse may be his worldly circumstances, or however ignoble his conduct; and it is not difficult to imagine an elevation of moral tone which would confer it even on a beggar.

ARISTOGEITON. See HARMODIUS AND ARISTOGEITON.

ARISTOLOCHIA, a genus of plants of the natural order *aristolochiaceæ* or *asarineæ*. This order, which is dicotyledonous or exogenous, consists of herbaceous plants or shrubs, often climbing shrubs, and contains upwards of 130 known species, chiefly natives of warm climates, and particularly abundant in the tropical regions of South America. The leaves are alternate, simple, stalked, often with a stipule; the flowers axillary, solitary, hermaphrodite, of a dull color; the perianth at its base adhering to the ovary, tubular, sometimes regular, but generally very irregular; the stamens 6 to 12, epigynous (or inserted upon the ovary), distinct, or adhering to the style; the ovary is generally six-celled, with numerous ovules; the style simple, the stigmas radiating, as numerous as the cells of the ovary; the fruit dry or succulent; the seeds with a very minute embryo at the base of fleshy albumen.—The genus *A.* is distinguished by a tubular oblique perianth, generally inflated at the base, the mouth dilated on one side, and by stamens adherent to the style, so that it is included in the Linnæan class *gynandria*. The species are mostly shrubby, and natives of tropical countries, some of them climbing to the summits of the loftiest trees. Several are found in the s. of Europe; one only, the common BIRTHWORT (*A. clematitis*), occurs upon the continent as far n. as about lat. 50°, and is a doubtful native of England. It is a perennial plant, with erect, naked, striated stem—heart-shaped dark-green leaves on long stalks—the flowers stalked, and growing to the number of sometimes 7 together from the axils of the leaves, the tube of the perianth about 1 in. long, and of a dirty yellow color. It grows chiefly in vineyards, hedges, about the borders of fields, among rubbish, and in waste places. It has a long branching root, with an unpleasant taste and smell, which, with the roots of *A. rotunda* and *A. longa*, two herbaceous species, natives of the s. of Europe, was formerly much used in medicine, being regarded as of great service in cases of difficult parturition, whence the English name. These roots possess powerful stimulating properties, and those of the southern species are still used as emmenagogues. The root of *A. indica* is used in the same way by the Hindoos.—*A. serpentaria*, VIRGINIAN SNAKEROOT, is a native of most parts of the United States, growing in woods. It has a flexuous stem, 8 to 10 in. high, bearing heart-shaped very acute leaves. The flowers are on stalks, which rise from the root; the orifice of the perianth is triangular. The root has a penetrating resinous smell, and a pungent, bitter taste. It has long been a fancied remedy for the bite of the rattlesnake. It possesses stimulant and tonic properties. It forms an article of export from the United States to Europe, and bears a high price, being highly esteemed as a medicine in certain kinds of fever.—Its reputation as a cure for serpent-bites is shared by other species, particularly *A. anguicida* and *A. quaco* (the guaco of Colombia), natives of the warmer parts of America. The juice has certainly the power of stupefying, and even of killing serpents; and it is said that a number of species are used by Egyptian jugglers, in order to their handling serpents with impunity.—Several South American species seem also to possess medicinal properties analogous to those of the Virginian snakeroot.—*A. siphon*, a climbing shrub of 15 to 20 ft. in height, a native of the southern parts of the Alleghany mountains, is frequently planted in the United States, in Britain, and on the continent of Europe, to form shady bowers. It has very large heart-shaped leaves (a foot in breadth), of a beautiful green. The flowers hang singly, or in pairs, on long stalks; the tube of the perianth is crooked

in its upper part, inflated at the base, and veined with reddish-brown veins, having a sort of resemblance to the bowl of a tobacco-pipe, for which reason the shrub is sometimes called pipe-shrub, pipe-vine, or Dutchman's pipe. The tropical species are distinguished for their beauty and the peculiar forms of their flowers. Some of them are much prized ornaments of our hot-houses.

To the natural order *aristolochiaceæ* belongs also the genus *ASARUM*.

ARISTOMENES, a Messenian statesman and general, who commanded the army in the second Messenian war. He fought with success from the battle of Deræ, 685, until 668 B.C., when he was finally defeated, and returned to Rhodes, where his son-in-law was one of the reigning princes. His fame lasted through many centuries.

ARISTOPHANES, the only writer of the old Greek comedy of whom we possess any entire works, was the son of one Philippus, and was b. at Athens about the year 444 B.C. We know very little of his history. Plato, in his *Symposium*, relates that he was fond of pleasure—a statement which it is easy to credit when we consider the tendencies of his profession in all ages. It seems equally clear, however, from the vigorous and consistent expression of his convictions in his various works, and from the fearless manner in which he assails the political vices of his day, that he was possessed of an honest and independent spirit. He appeared as a comic writer in the fourth year of the Peloponnesian war (427 B.C.). The piece which he produced was entitled *Daitaleis* (the Banqueters), and received the second prize. It ridiculed the follies of extravagance, and, like all his subsequent works, was pervaded by a contempt of modern life, and an admiration of the sentiments and manners of the earlier generations. Next year, he wrote the *Babylonians*; in which he satirized Cleon, the so-called demagogue, so sharply, that the latter endeavored to deprive him of the rights of citizenship, by insinuating that he was not a real Athenian. This, in all probability, gave rise to the various traditions of A. having been born in Rhodes, Egypt, etc. Fragments of these plays remain. In 425, his *Acharnians* obtained the first prize. It was written to expose the madness of the war then waging between Athens and Sparta, and exhibits the feelings of the "peace-party" in the former city. It is still extant. In 424 appeared *Hippes*, the *Knights* or *Horsemen*. It was the first which the poet produced in his own name, and evinces the singular boldness of the author. It is leveled against Cleon, and presents us with a striking picture both of a vulgar and insolent charlatan, and of the fickle, cunning, credulous, and rather stupid mob over whom he precariously despotizes. It is related of this piece that, when no actor would undertake to play the part of the influential Cleon, A. himself impersonated the demagogue. Unfortunately for the character of Cleon, as well as that of the Athenian democracy, these caricatures and misrepresentations of A. have been received as historical pictures. How far they are from the truth, has been clearly shown by Grote, in his *History of Greece*. See **CLEON**. In 423, A. produced the *Clouds*, which, along with the *Knights*, are the two most famous of his comedies. They exhibit in overflowing richness that fancy, wit, humor, satire, and shrewd insight which characterize this greatest of all Greek comic writers. The *Clouds*, however, displays at the same time the weaknesses and limitations of A.'s mind. Its aim was to deride the pretensions of the new sophistical school, and to point out its pernicious tendencies. So far well. But A., who was no philosopher, demonstrates his own incapacity to appreciate the highest range of thought and character, by selecting no less a person than Socrates as the most perfect representative of a sophist. A., who was both religiously and politically conservative, had apparently no clearer conception of abstract truth than is involved in reverence for the sanctities of the past, the old gods, old traditions, old manners, and old sentiments. He had an instinctive hatred of innovations, and considered all equally pernicious. As he had represented Cleon the reformer as a vulgar innovator and demagogue, ruled by the lowest considerations, he makes the innovating views of Socrates also proceed from corrupt motives, veiled perhaps with more craft. Alcibiades is caricatured in this brilliant comedy as a wildly extravagant youth, whose career of ruin is accelerated by the insidious instructions of Socrates; and a hint is thrown out towards the end of the piece, which unfortunately proved to be the "shadow" of a "coming event." A. represents the father of Alcibiades as about to burn the philosopher and his whole *phrontisterion* (subtlety-shop); and there can be little doubt that this dramatic vilification of the purest of heathen moralists led to that persecution which, twenty years later, culminated in his condemnation and death. In 422 appeared the *Wasps*, still extant, in which the popular courts of justice are attacked; and three years later, in his *Peace*, he returns to the subject of the Peloponnesian war, which is ridiculed with great cleverness. In 414, he produced two comedies, *Amphiaræus* and the *Birds*, both of which caricature, in the liveliest manner, the Sicilian expedition, then being meditated, but which proved so utter a failure. The *Lysistrata* belongs to the year 411, and exhibits a civil war of the sexes, as the monstrous issue of that in the Peloponnesus. In his *Plutus* and *Ecclesiazusæ*, which respectively appeared in 408 and 392, true to his mission as the enemy of innovation, he assailed the new passion for Doric manners and institutions, and ventured to ridicule Plato, in that, however, in which the philosopher is weakest—namely, his political theory. Euripides, also, as the sophist among poets, is severely handled in the *Frogs*, which belongs to the year 405.

A. wrote 54 comedies, of which only 11 are extant. He is acknowledged to stand far

above all his contemporaries or successors of the middle and new comedy in wealth of fancy and beauty of language. His choruses sometimes exhibit the purest spirit of poetry: and Plato himself says that the soul of A. was a temple for the graces. The ingenuity which he displays in the mechanical artifices of verse is not less wonderful. Frogs are made to croak choruses, pigs to grunt through a series of iambs, and words are coined of amazing length—the *Écclesiastus* closes with one composed of 170 letters. It only remains to be added, what might naturally be expected, that the personalities in which A. indulged descend at times into coarseness and indecency, and that even the gods whom he undertook to defend are treated with levity, and placed in the most ludicrous lights.

The comedies of A. have been edited by Brunck (1781–1783), Dindorf (1794–1826), Bekker (1829). They have all been translated into German by Voss (Brunswick, 1821), and there are several translations of single plays into English.

ARISTOTELIA. See MAQUIL.

ARISTOTLE was b. at the Grecian colonial town of Stageira, on the w. side of the Strymonic gulf (now the gulf of Contessa, in Turkey in Europe), in the year 384 B.C. He belonged to a family in which the practice of physic was hereditary. His father, Nikomachus, was the friend and physician of Amyntas II., king of Macedonia, father of Philip, and grandfather of Alexander the great. A. lost both parents while he was quite young, and was brought up under the care of Proxenus, a citizen of Atarneus, in Asia Minor, who was then settled at Stageira. It is to be conjectured that his education, such as it was, would take the direction of preparing him for the family profession, and that whatever knowledge and power of manipulation attached to the practice of physic at that time would rank among his early acquisitions. In after-life, he occupied himself largely in the dissecting of animals, and was acquainted with all the facts that had been derived from this source by others before him. It seems probable, however, that he early abandoned the intention of following physic as a profession, and aspired to that cultivation of universal knowledge for its own sake, in which he attained a distinction without parallel in the history of the human race.

In his 18th year (367 B.C.) he left Stageira for Athens, then the intellectual center of Greece and of the civilized world. Plato, on whom he doubtless had his eye as his chief instructor, was then absent at Syracuse in that extraordinary episode of his life, connecting him as political adviser with the two successive Syracusan despots—Dionysius the elder, and Dionysius the younger—and with Dion. A., therefore, pursued his studies by books, and by the help of any other masters he could find, during the first three years of his stay. On the return of Plato, he became his pupil, and soon made his master aware of the remarkable penetration and reach of his intellect. The expressions said to have been used by Plato imply as much; for we are told that he spoke of A. as the “intellect of the school.” Unfortunately, there is a total absence of particulars or precise information as to the early studies of the rising philosopher. He remained at Athens twenty years, during which the only facts recorded, in addition to his studying with Plato, are, that he set up a class of rhetoric, and that in so doing he became the rival of the celebrated orator and rhetorical teacher, Isocrates, whom he appears to have attacked with great severity. It was in the schools of rhetoric that the young men of Athens got the principal part of their education for public life. They learned the art of speaking before the dikasteries, or courts of law, and the public assembly, with efficiency and elegance; and incidentally acquired the notions of law and public policy that regulated the management of affairs at the time. We can easily suppose that A. would look with contempt upon the shallowness—in all that regarded thought or subject-matter—of the common rhetorical teaching, of which, doubtless, the prevailing excellence would lie in the form of the address, being artistic rather than profound or erudite. One of the disciples of Isocrates, defending his master against A., wrote a treatise wherein allusion is made to a work (now lost) on proverbs, the first recorded publication of the philosopher.

The death of Plato (347 B.C.) was the occasion of A.'s departure from Athens. It was not extraordinary or unreasonable that A. should hope to succeed his master as the chief of his school, named the academy. We now know that no other man then existing had an equal title to that pre-eminence. Plato, however, left his nephew Spensippus as his successor. We may suppose the disappointment thus arising to have been the principal circumstance that determined A. to stay no longer in Athens; but there are also other reasons that may be assigned, arising out of his relations with the Macedonian royal family at a time when the Athenians and Philip had come into open enmity.

Whatever may be the explanation, he went in his 37th year, after a stay of nearly 20 years in Athens, to the Mysian town of Atarneus, in Asia Minor, opposite to the island of Lesbos. Here he lived with Hermias, the chief of the town, a man of singular energy and ability, who had conquered his dominion for himself from the Persians, at that time masters of nearly all Asia Minor. A. had taught him rhetoric at Athens, and he became in return the attached friend and admirer of his teacher. For three years the two lived together in the stronghold of Atarneus; but by treachery and false promises, the Rhodian Mentor, an officer in the Persian service, got possession of

the person of Hermeias, put him to death, and became master of all the places held by him. A. accordingly fled, and took refuge in Mitylene, the chief city of the neighboring island of Lesbos. He also took with him Pythias, the sister of Hermeias, and made her his wife. In a noble ode, he has commemorated the merits of his friend thus lost to him through the treachery of a Greek renegade. His wife, Pythias, died a few years afterwards in Macedonia, leaving him a daughter of the same name. His son, Nikomachus, to whom he dedicated his chief work on ethics—called, in consequence, *Nikomachean Ethics*—was born to him at a later period of his life by a concubine.

After two years' stay at Mitylene, he was invited (in the year 342 B.C., age 42) by Philip to Macedonia, to educate his son Alexander, then in his 14th year. What course of study Alexander was made to go through, we cannot state. He enjoyed the teaching of A. for at least three years, and contracted a strong attachment to his preceptor, which events afterwards converted into bitter enmity. The two parted finally when Alexander commenced his expedition into Asia (334 B.C.), and A. came from Macedonia to Athens, having recommended to the future conqueror, as a companion in his campaigns, the philosopher Calisthenes, whom he educated along with Alexander. Now at the age of 50, he entered on the final epoch of his life; he opened a school called the "Lyceum," from its proximity to the temple of Apollo Lyceus. From his practice of walking up and down in the garden during his lectures arose the other name of his school and sect, the *Peripatetic*. It would appear to have been his habit to give a morning lecture to select pupils on the more abstruse subjects, and one in the evening of a more popular kind to a general audience. He may now be supposed to have composed his principal writings; but, unfortunately, there is nothing known of the dates of any of them. This crowning period of his life lasted twelve years. After the death of Alexander, the anti-Macedonian party at Athens obtained an ascendancy, and among other consequences, an accusation was prepared against A., the pretext being impiety. With the fate of Socrates before his eyes, he chose a timely escape, and in the beginning of 322 B.C., took refuge at Chalcis in Eubœa, where, in the autumn of the same year, he died, aged 62. He had long been afflicted with indigestion, and ultimately sank under this malady. His tomb is thought to have been discovered by Waldstein in 1890.

The *philosophy* of A. differed from that of Plato on many points, especially in the fundamental doctrine termed the theory of ideas. The Platonic "ideas" or "forms" were conceived as real existences, imparting all that is common to the particular facts or realities, instead of being derived from them by an operation of the mind. Thus, the actual circles of nature derive their mathematical properties from the pre-existing "idea," or circle in the abstract; the actual men owe their sameness to the ideal man. A. was opposed to this doctrine throughout, although he always speaks of its author with respect, and sometimes with affection. The whole method of A. was in marked contrast to the Platonic handling of philosophical subjects: he was a most assiduous observer and collector of facts, from which he drew inductions with more or less accuracy. Plato, on the other hand, valued facts merely in criticising the views that he was bent upon demolishing, and not as a means of establishing sound theories.

The writings of A. may be said to have embraced the whole circle of the knowledge of his time. Many of them are lost; those that remain refer principally to the following departments.

Astronomy, mechanics, physics, were treated of by him at some length; but here his failure was complete, if we look at his writings from the point of view now acquired. He was the victim of capricious fancies, based upon doctrines common among his contemporaries, accepted by him as principles of reasoning, and conducting him to the most unsound conclusions. His theory of the rotation of the sphere, the necessary perfection of circular motion, of the impossibility of a vacuum, and the like, did more to confuse than to explain the phenomena of nature. Nor can it be said that the time was not ripe for putting these subjects on a rational basis; for he was very shortly followed by a series of men, who both observed and reasoned soundly respecting them, and laid the foundation of their great subsequent progress—namely, Euclid, Apollonius, Archimedes, Eratosthenes, and Hipparchus.

The thirteen books called metaphysics contain much profound thought, but are obscure and defectively arranged; indeed, neither the actual arrangement of the books nor the title which they bear, can be ascribed to A. himself. The subject to which they are devoted is ontology—the science of *ens, quatenus ens*—which he terms *philosophia prima*, and sometimes theology. He distinguishes three branches of theoretical philosophy. 1. Physics—the study of sensible material particular things, each of which differs from every other, and all of which have in themselves the principle of change or motion. 2. Mathematics—that of geometrical and numerical entities, known by general definitions, susceptible neither of change nor of movement, capable of being considered and reasoned upon apart from matter, but not capable of existing apart from matter. 3. The first or highest philosophy—which studies the essences of things eternal, unchangeable, and apart from all that change, movement, and differentiation which material embodiment involves.

The metaphysics, or first philosophy, does in fact deal with the extreme abstractions or generalities of all sciences. It is a collection, partly of doubts and difficulties, partly of attempted solutions, upon these last refinements of the human mind. It includes

many valuable comments on the philosophy of Plato and others anterior to or contemporary with A. The general terms and subtle distinctions which this treatise first brought to view, were highly prized throughout all the philosophy of the middle ages.

He appears in a very different light in his great work on animals. He has here amassed a stock of genuine observations, and also introduced a method of classification which continues to this day as the most approved groundwork of zoological classification. In this work we see perhaps, in the most advantageous light, the two great qualities of his mind, rarely coupled in the same individual—the aptitude for observation and logical method. The excellence shown in his various writings generally depends upon one or other of these qualities.

His Organon or logic is his complete development of formal reasoning, and is the basis and nearly the whole substance of syllogistic or scholastic logic. This science he almost entirely created. Mr. Grote observes (*History of Greece*, part ii. chap. lxxviii.) that “what was begun by Socrates, and improved by Plato, was embodied as a part of a comprehensive system of formal logic by the genius of A.; a system which was not only of extraordinary value in reference to the processes and controversies of its time, but which also, having become insensibly worked into the minds of instructed men, has contributed much to form what is correct in the habits of modern thinking. Though it has now been enlarged and recast by some modern authors (especially by Mr. John Stuart Mill in his admirable *System of Logic*) into a structure commensurate with the vast increase of knowledge and extension of positive method belonging to the present day—we must recollect that the distance between the best modern logic and that of A. is hardly so great as that between A. and those who preceded him by a century—Empedocles, Anaxagoras, and the Pythagoreans; and that the movement in advance of these latter commences with Socrates.”

A considerable portion of his writings relate to the human mind and body. In one of these, a short treatise on *Memory and Recollection*, he gave the first statement of the laws of association of ideas.

His treatises on rhetoric and poetics were the earliest development of a philosophy of criticism, and still continue to be studied. The same remark is applicable to his elaborate disquisitions on ethics.

Perhaps one of his greatest works is his *Politics*, based upon a collection made by himself of 158 different constitutions of state, and some say that he had arranged and digested as many as 360 constitutions. Here we see the spirit of the inductive observer, which indeed is no less apparent in the works mentioned in the last paragraph. By many he is regarded as the founder of political science, and several principles now accepted were first expounded by him. His analysis of the state and government into their elements is of great value and his classification of governments into monarchies, aristocracies, and democracies is still followed, though the mixture of forms at the present time, has deprived it of much of its former usefulness. The essence of his doctrine is summed up in his famous phrase, “Man is a political animal,” which means that nature intended man to live in society and that his moral and mental development is dependent upon social environment. Another familiar principle which Aristotle was the first to set forth, is that in the abuse of the principle at the basis of each form of government, lies its greatest danger. For example, the extreme of democracy verges on anarchy, and a monarchy is often in danger of becoming a tyranny. Slavery, he thought, was based on nature. Some men were born to rule others, the latter being naturally incapable of self-government. It was therefore the part of justice to conquer and reduce to slavery those races which were unfit to govern themselves. The same idea which is at the basis of this principle of natural slavery, appears in his view of the political status of woman, whom he held to be fixed by nature in a condition of inferiority to man. His theory of the ideal state is wholly opposed to the communism which characterizes Plato's *Republic*. He does not believe in permitting the absorption of the individual and family by the state. He prefers as a form of government a monarchy in which the ruler is wise and an aristocracy which is really a government by the best. These are more capable of realizing ideal government than a system in which wealth or numbers is paramount. Of politics in their international aspect he has little to say and confines his view to the internal welfare of a single state. In 1890, a papyrus in the British Museum was found to contain a treatise by Aristotle on the Constitution of Athens. It has been edited by Kenyon with notes and a translation (1891).

ARISTOXENUS, of Tarentum, a pupil of Aristotle's, and one of the oldest writers upon music, flourished about 330 years B. C. He was extraordinarily active and versatile in his literary studies, and is said to have composed upwards of 450 treatises on music, history, and philosophy. On the death of Aristotle, he fully expected to be appointed his successor, and is said to have been deeply mortified when Theophrastus was preferred; but this statement is discredited by many. He founded a school of musicians, who were called after him, Aristoxeneans, and whose distinguishing characteristic was that they judged of the notes in the diatonic scale exclusively by the ear, while the Pythagoreans determined these mathematically. Except his *Elements of Harmony*, in three books, which we still possess, only a few fragments of his writings survive in later authors.

ARITHMETIC is the science that treats of numbers (Gr. *arithmos*). It is sometimes divided into theoretical and practical: the former investigating the properties of numbers and their combinations, the latter applying the principles so established, in the form of rules, to actual calculations. Some restrict the term A. to this art of reckoning, assigning the investigation of the principles to analysis.

Among the ancient Greeks and Romans, A. made little progress, owing to their clumsy modes of notation. Few of their writings on the subject have come down to us; the most important are those of Euclid (7 to 10 B. of the *Elements*), Archimedes, Diophantus, and Nicomachus. After the introduction of the decimal system and the Arabic or Hindu numerals (see NUMERALS), about the 11th c., A. began to assume a new form; but it was not till the 16th c. that the double rule of three, or compound proportion, was discovered, and decimal fractions were introduced. The invention of logarithms in the 17th c. is the last great step in advance that the art has made. Passing over the elementary operations of addition, etc., the chief heads, such as FRACTIONS, DECIMALS, PROPORTION, LOGARITHMS, etc., will be noticed in their proper places.

ARITHMETICAL MEAN is that number that lies equally distant between two others; thus, the A. M. between 11 and 17 is 14, which is found by taking half their sum.

ARITHMETICAL PROGRESSION is a series of numbers that increase or diminish by a common difference, as 7, 10, 13, 16, 19, 22; or 12, 10½, 9, 7½, 6. To find the sum of such a series, multiply the sum of the first and last terms by half the number of terms. The series of natural numbers, 1, 2, 3, 4, etc., form an A. P., of which the difference is 1.

ARITHMETICAL SIGNS are arbitrary marks or symbols used to denote the operations to be performed on numbers, or the relations existing between them. *Ex. gr.*, $7 + 5$ indicates that 7 and 5 are to be *added* together; $7 - 5$, that 5 is to be *subtracted* from 7; 7^5 that 7 is to be raised to the fifth *power*; $7 + 5 = 15 - 3$, that when 7 and 5 are added together, the result is *equal* to the difference between 15 and 3. The same signs are also used in algebra; and an enumeration and explanation of them may be found in almost any treatise on arithmetic or algebra.

ARIUS, the celebrated founder of Arianism, was a native of Libya, and is generally supposed to have been b. shortly after the middle of the 3d century. About the year 306 A.D., Alexandria was thrown into confusion by the violence of its religious disputes, and in these A. was largely mixed up. At first, he took part with Meletius, bishop of Lycopolis, in upper Egypt, a man who was strenuously opposed to certain notions of discipline entertained by Peter, bishop of Alexandria; but afterwards he became reconciled to the latter, who made A. a deacon. The reconciliation, however, was brief. A. once more took the part of Meletius, and was excommunicated by Peter in consequence; but the latter dying soon after, Achillas, his successor, restored A. to his office, and even advanced him to the dignity of a presbyter, 313 A.D. His new function required that he should interpret the Scriptures, and, as he possessed an abundance of natural gifts, united with great learning, it is not wonderful that his preaching should have become popular, and his peculiarities of opinion been vehemently embraced. The first time, however, that A. was brought into collision on a point of doctrine with his ecclesiastical superiors, was in 318 A.D. Alexander, bishop of Alexandria, and successor of Achillas, having in a public assembly of clergy, while speaking of the Trinity, said that it contained one single essence, or indivisible unity of substance, A. alleged that such a conception was impossible to the human mind, and accused Alexander of Sabellianism—i.e., of destroying the distinction of persons. The dispute grew hot, and a conference which was held to settle it only embittered the disputants. In maintaining his ground, A. went beyond his first statement of the absolute distinctness of person between the Father and the Son; he maintained that the Son was not co-equal or co-eternal with the Father, but only the first and highest of all finite beings, created out of nothing by an act of God's free will, and that he ought not to be ranked with the Father.

A. was successful in securing the adherence of large numbers both of the clergy and laity in Egypt, Syria, and Asia Minor. In 321 a synod of bishops was held at Alexandria. These deposed and excommunicated A., and active measures were taken to let this decision be known over all the Christian churches; Alexander himself wrote numerous letters (two of which are still extant), exhorting the bishops not to receive the "heretic." In consequence of these violent steps, the breach was widened between both parties. To escape persecution, A. retired to Palestine, where he wrote a letter to his friend Eusebius, who was bishop of Nicomedeia, a city of Bithynia, and not far from Constantinople. Eusebius, one of the most influential Christians of his time, warmly sympathized with him; wrote in his behalf to Paulinus, bishop of Tyre, and others; absolved him from the Alexandrian synod's excommunication; and in 323 convened another synod in Bithynia, which pronounced favorably on A. He even enlisted Constantine on the side of the latter, to this extent at least, that the half-pagan emperor addressed admonitions to both Alexander and A., assuring them that the point in dispute was a trifling one, and ought not to provoke a serious quarrel. While A. was residing at Nicomedeia, he wrote a theological work in verse and prose, called *Thaleia*, some fragments of which remain, and indicate an earnest and philosophic mind, but at the same time contain expressions which could not but pain a believer in the divinity of

Christ. The *Thaleia* is said to have been sung by the Arian neophytes, who thus kindled the passions of their adversaries, and increased the virulence of the contest. The comedians, who were pagans, took advantage of the occasion to ridicule the Christian religion in the theaters. The officers of the emperor in several cities wished to repress this profane temerity, but the interference only created greater confusion.

It now became impossible for the emperor to remain neutral or indifferent, with safety to himself, or to the tranquillity of the empire. Hosius, bishop of Corduba, whom he had appointed mediator betwixt Alexander and A., took part with the former, and reported unfavorably of A. The result was, that Constantine, in order, as he thought, to effect a final settlement of the question, convoked the memorable council of Nicæa (Nice, q. v.), in Bithynia, 325 A. D. Three hundred and eighteen bishops from almost all parts of the Christian world, but especially from the east, were present, besides numbers of priests, deacons, and acolytes. A. boldly expounded and defended his opinions. He declared in the most unambiguous manner that the Son of God was created out of nothing; that he had not always existed; that he was not immutable or impeccable; that it was through his free-will he remained good and holy; that if he had chosen, he could as easily have sinned as not; in a word, that he was a mere creature and work of the Deity. He further affirmed that the Son of God was not of the same substance with the Father; that he was not the "Word" or "Wisdom," properly speaking; and that the Scriptures only attribute these names to him as they do to other created intelligences. These propositions were listened to with great calmness by the bishops, but the inferior clergy, or at least a majority of them, manifested the most violent opposition. The document containing his confession of faith was torn to pieces before his face. Arguments, however, of a more rational kind were also employed. Alexander was ably seconded by the young deacon, Athanasius, the equal of A. in eloquence, and in the power of his logic. It was principally by the reasonings of Athanasius that the council was persuaded to define, in the most precise manner, the doctrine of the Godhead—viz., the absolute unity of the divine essence, and the absolute equality of the three persons. All the bishops subscribed it except two, Theonas of Marmarica, and Secundus of Ptolemais, who had the heroism (for it must be considered such) to follow the banished A. into Illyricum.

An imperial edict was now issued commanding the writings of A. to be burned, and threatening with capital punishment all who should be convicted of concealing them. This change in the emperor's sentiments as to the importance of the doctrine at issue is attributed by some writers to his recognizing the will of heaven in the harmonious consent of so many bishops. A more probable explanation is, that he anticipated the utmost social confusion from the collision of opinions, and resolved to crush that which was at once the youngest and the weakest, hoping thereby to remove the ground of disturbance. He was mistaken, however. At Alexandria, the Arians continued in a state of open insurrection, and began to league themselves with other condemned sects, for the purposes of mutual defense. The great influence of Eusebius was also exerted on behalf of the exiled heretic, as well as that of Constantia, the sister of the emperor, who had herself embraced Arian tenets, and in 328, permission was granted him to return from Illyricum. Constantine was very gracious, perhaps because he thought the chances of peace being restored to the community were now greater, for it had been represented to him by Eusebius that the doctrines of A. did not essentially differ from those of the Nicene council. In 330 A. D., A. had an interview with the emperor, and succeeded in convincing him that Eusebius had only spoken the truth. In the confession of faith which he presented, he declared his belief that the Son was born of the Father before all ages, and that as the "Word," he had made all things both in heaven and earth. The emperor was satisfied, and sent orders to Athanasius, now bishop of Alexandria, to receive A. into the communion of the church. This Athanasius refused to do, and a series of tumults was the consequence. Eusebius was greatly irritated. He called a synod of bishops at Tyre, in 335 A. D., which proceeded to depose Athanasius. The emperor was even prevailed on to remove the latter to Gaul, though he alleged as his reason that he wished to deliver him from the machinations of his enemies. In the same year, another synod met at Jerusalem, which revoked the sentence of excommunication uttered against A. and his friends. Still the majority of the Christians of Alexandria clung to the doctrines of Athanasius, and resolutely resisted every effort to establish the new opinions among them. Disappointed in his expectations, A., in 336 A. D., proceeded to Constantinople, where he presented the emperor with another apparently orthodox confession of faith; whereupon orders were issued to Alexander, bishop of Constantinople, to administer to Arius the holy communion on the Sunday following. This was considered a grand triumph by Eusebius and his friends, and when the day arrived, they escorted A., as a guard of honor, through the streets of the metropolis. When about to enter the temple in which it was intended that he should be received with solemn pomp, he retired a moment to relieve nature, but fainted, and died of a violent hemorrhage. His disciples declared that he had been poisoned, while the orthodox devoutly affirmed that God had answered the prayers of Alexander.

A. was exceedingly handsome, but the harassing cares of a life spent in a continual struggle with his adversaries are said to have given him a worn and haggard look. His manners were graceful and modest; he was noted for even an ascetic abstinence, and the

purity of his moral character was never challenged by a single enemy. A. is said to have composed songs for sailors, millers, and travelers, in popular measures, for the purpose of spreading his peculiar tenets; but no traces of these survive.

After the death of A., his followers rallied round Eusebius, now bishop of Constantinople (338), from whom they were styled Eusebians. The reconciliatory middle party of Eusebius of Casarea (d. 340 A.D.), who wished to end the great controversy by abstaining from all strict dogmatic assertions on the matter, soon dwindled into insignificance between the two contending parties. Constans, who ruled the west after the death of Constantine (337), and Constantius, in the east, made an essay toward reconciliation, but it failed at the synod of Sardis (347), where the occidental bishops gathered themselves round Athanasius in support of the *homoousian* doctrine (identity or sameness of substance), while in a separate council at Philippopolis, the oriental bishops asserted the *homoiousian* doctrine (implying merely similarity of substance). Slight as might appear the verbal difference between the two parties, the bitterness of the controversy was intense, and pervaded almost all departments of public and private life. Constantius having, by the death of Constans (350) and conquest over Magnentius (353), gained dominion over the west, the Arian cause, which he favored, triumphed at the synod of Arles or Arles (353), and at that of Milan (355). These victories, however, were more apparent than real. The Nicene doctrine had still strong support on its side, and was strictly maintained by the banished Athanasius and his friends, while the Antiniceans, soon after their triumph, were divided into at least three parties. The old Arians, also styled Anomœoi, or Heterousians, asserted, in the boldest style, their doctrine of "distinct substances." The semi-Arians (a large majority in the eastern church) maintained the homoiousian doctrine of similar substances. A third party held the same doctrine with some qualification. Morally, the victory was leaning to the side of the Nicæans. Julian the apostate (361-363), in his hatred of the Christian religion, left all parties at liberty to contend as they pleased with one another, so that they did not interfere with his plans. Jovianus and his followers in the west, Valentinianus I., Gratianus, and Valentinianus II., extended full toleration to both parties. Arianism, at last, was virtually abolished in the Roman empire, under Theodosius in the east (379-395), and Valentinianus II. in the west. Among the German nations, however, it continued to spread through missionary efforts. Bishop Ulfilas, the translator of the Bible into the Mæso-Gothic language, had been the means of converting the west Goths to Arian Christianity as early as 348; and they adhered to it until the synod of Toledo in 589. The east Goths, Vandals, Burgundians, the Suevi in Spain, and the Longobards also adopted Arianism; but in all these instances the Nicene doctrine ultimately prevailed, most slowly among the Longobards, who retained the Arian creed until 662. The Arian controversy has never excited any great interest in modern times, though in England it was revived for a time by the writings of the learned Dr. Samuel Clarke (1675-1729), and also by Whiston, who d. in 1752. More recently, a part of the Arian doctrine, the denial of "the eternal sonship," was broached in the Wesleyan Methodist society by Dr. Adam Clarke and a few followers; but it was soon suppressed by the conference. Pure Arianism can hardly now be said to exist. It has gradually lapsed into Unitarianism. See UNITARIANS.

ARIZONA, a s.w. territory of the United States; between lat. 31° 37' and 37° n.; long. 109° 3' and 114° 25' w.; bounded on the n. by Nevada and Utah; on the e. by New Mexico; on the s. by Mexico (Sonora); on the w. by California and Nevada, from which it is separated by the Colorado river; length, 370 m.; breadth, 350 m.; gross area, 113,920 sq. m. Its popular name is "the Apache State."

Long before its discovery by white men, A. was inhabited by a superior race, whose ruined cities, aqueducts, and fortifications are numerous in the valleys and cañons, and show that the population was large. In 1539 padre Marco de Nizan, with a companion, left the city of Mexico to explore the country now included in A. and New Mexico, being stimulated by rumors of its mineral wealth and of its populous "Seven cities of Cibola." The report brought back was so favorable that in 1540 Vasquez de Coronado led an expedition thither, visiting the Moqui villages and New Mexican pueblos, and exploring, it is believed, as far n. as lat. 40°. The first colony was established about 1596. In 1680 the Spanish were driven out of the country, but by 1695 had recovered nearly all of it, and about that date the mission of San Xavier was founded, and the presidio of Tucson (Tucson). By 1720 a line of Jesuit missions and of ranches, presidios, and mining stations extended southward from Tucson, including the mission of St. Xavier, still existing, and the town of Tubac. Most, if not all, of the Indian tribes were visited by the Jesuits or the Franciscans, but no thorough exploration was made, and in 1775 the 18 missions in what is now A. were all south of the Gila river. The hostility of the Apaches and other tribes prevented further advance, and outbreaks in 1802 and 1827, added to the disorder attending the Mexican revolution, led to the abandonment of the mines and ranches, and of the settlements, excepting Tucson and Tubac. In 1824 some trappers from Kentucky crossed A., by way of the Gila, to the Pacific coast—a route that was followed by emigrants to California in 1849. By the treaty of Guadalupe Hidalgo, signed Feb. 2, 1848, A., then included in New Mexico, became the property of the U. S., except the tract s. of the Gila, which was a part of the Mexican state of Sonora, and was not acquired till Dec. 30, 1853. (See GADSDEN PURCHASE.) In July, 1861, the U. S. troops withdrew, leaving A. exposed to the raids of Indians and renegade Mexicans. In

AREA AND POPULATION OF ARIZONA AND NEW MEXICO BY COUNTIES.

(ELEVENTH CENSUS : 1890.)

ARIZONA.

	Area in Square Miles.	Population.		Area in Square Miles.	Population.
Apache.....	21,090	4,281	Pima.....	10,596	12,673
Cochise.....	6,004	6,938	Pinal.....	5,300	4,251
Gila.....	3,212	2,021	Yavapai.....	29,236	8,685
Graham.....	6,152	5,670	Yuma.....	10,136	2,671
Maricopa.....	9,892	10,986			
Mohave.....	11,332	1,444	Total.....	112,920	59,620

NEW MEXICO.

	Area in Square Miles.	Population.		Area in Square Miles.	Population.
Bernalillo.....	8,628	20,913	San Juan.....	6,008	1,890
*Chaves.....	.....	.....	San Miguel.....	13,246	24,204
Colfax.....	6,600	7,974	Santa Fé.....	2,292	13,562
Doña Ana.....	8,992	9,191	Sierra.....	3,116	3,630
*Eddy.....	.....	.....	Socorro.....	15,476	9,595
Grant.....	9,300	9,657	Taos.....	2,300	9,863
Lincoln.....	26,452	7,081	Valencia.....	8,900	13,876
Mora.....	4,000	10,618			
Rio Arriba.....	7,150	11,534	Total.....	122,460	153,593

*Act creating Chaves and Eddy counties had not gone into effect on June 1, 1890.

ARIZONA AND

SCALE

0 10 20 40

County Towns





1863, Feb. 24, the territory of A. was organized with 4 cos., and in this year a tract of 12,225 acres w. of the Colorado was set off to Nevada.

The greater part of A. consists of broad plateaus, elevated from 3000-7000 ft., and traversed by mountain chains, having in general a n.w. and s.e. direction. The most rugged portions are in the n.w. and s.e. corners. Among the central ranges are the Gila, Apache, Black Mesa, Sierra Prieta, and San Francisco, the last name lifting its main peak (Humphrey's) to a height of 12,561 ft. With an average elevation in the n.e. of 5000 ft., the surface gradually descends toward the s.w., and toward the Mexican border sinks to a basin not over 2000 ft. above the sea, though even this region contains some mountains. The plateaus everywhere are dotted with *mesas* (table-lands with precipitous sides) and with buttes and eminences worn by storms or running water into fantastic shapes. Of volcanic peaks, which are numerous, the San Francisco mountains form the principal group. Eastern A. has many park-like and very beautiful valleys. The only navigable river, the Colorado (q.v.), has as its chief tributaries the Little Colorado and Gila, and between the two receives only two small streams. The cañons of the Gila and Colorado-Chiquito, or Little Colorado, the latter 2000-3000 ft. deep in one place, are scarcely less wonderful, though shorter, than the great chasm through which the Colorado flows. Hot and mineral springs are common. There are extensive lava beds in the n. Silver and gold are found in nearly every district. Other mineral products are copper, lead, iron ore, zinc, nickel, platinum, cinnabar, antimony; anthracite, bituminous, lignite and coking coal; rock salt, borax, agate, and malachite. The fauna include the grizzly and cinnamon bear, cougar, peccary, mountain sheep, antelope, two species of deer, squirrel, golden eagle, vulture, wild turkey, heron, and cross-bill; also the rattlesnake and horned toad. The climate is dry and healthful, but very hot, especially in the s.w. Prescott has a mean yearly temperature of 65.49°. The heaviest rains fall in July-Aug. and in Jan.-Feb., and the mean annual fall is 20 in. The land available for agriculture lies mainly in the central, e. and n.e., but large sections elsewhere have been redeemed by irrigation. Wheat, corn, oats, alfalfa, and all fruits and vegetables of the temperate and semi-tropic zones are produced. Cotton, sugar-cane, tobacco, hemp, and rice grow in the warm valleys; and among fruits are the apple, plum, peach, orange, fig, olive, and grape. The agricultural productions in 1896 were wheat, 333,500 bush., hay, 103,501 tons. Stock-raising and the fattening of hogs are important industries. In 1896, 12 railroads were operated with a total mileage of 1295.

The leading religious denomination is the Roman Catholic, the Jesuits having established missions and schools, and worked for the conversion of the natives as early as 1687. In 1896 the school enrollment was 12,883 children. There were the University of Arizona at Tucson, a normal college at Tempe, high schools at Florence, Prescott and Tucson, a reformatory for criminal offenders at Flagstaff, an intercollegiate school at Phoenix, an insane asylum at Phoenix, and a penitentiary at Yuma. The Indians numbered 38,000 and occupied five reservations. The value of the metallic output was: gold, \$5,200,000; silver, \$1,105,855; copper, \$7,121,033; and lead, \$531,375. Phoenix, the capital, is pleasantly located in the Salt River Valley. Much has been done in this section by irrigation, and large orange groves and vineyards are the result. Tucson, the largest city, is in the Santa Cruz Valley, and has a large trade with Sonora. Prescott is in the rich mining region near the centre of the state; it has a delightful climate, being nearly 6000 feet above the sea level. Clifton, in the extreme eastern part, is in the midst of some of the richest copper deposits in the world. Globe, north of Tucson, and Bisbee, in the extreme southeastern corner, are both noted for their copper-works. Tombstone, also in the southeastern corner, is in the midst of rich silver deposits.

The Governor and executive officers are appointed by the President. The legislature meets biennially, and comprises a council of twelve members, and a house of twenty-four members, elected by the people. There is a Supreme court of four judges, appointed by the President. The registration of votes is required. Woman suffrage exists in a limited way. The legal rate of interest is seven per cent. Judgments out-law in five years; notes in five years, and open accounts in three years. Wilful neglect, drunkenness, cruel treatment, abandonment for six months, are the chief causes for divorce; required residence, six months. The principal Indian tribes are the Moqui and Zuni (cliff-dwellers) and Navajos in the n. e.; the Pimas and Maricopas on the Gila; the Papagoes near Tucson; the Mohaves on the Colorado; the Yumas near Fort Yuma, and the Hualapais near the grand cañon. In 1896, the Apache, Mohawk and Yuma Indians on the San Carlos reservation ceded to the government part of their lands containing valuable coal fields. The total pop. of A., 1880, was 40,440. Population, 1890, 59,620. There are 12 cos. The largest cities (pop. 1890) are Tucson, 5150; Phoenix, 3152; Prescott, 1759; Yuma, 1773, and Tombstone, 1875.

ARK, a term in the Bible for three objects: Noah's A., the A. of bulrushes in which Moses was laid, and the A. of the Covenant (see **ARK OF THE COVENANT**). Noah's A. was not a ship, but more like a barge, intended not to sail, but only to float. Its shape was that of a parallelogram, 300 cubits long, 50 wide, and 30 high; but the length of the cubit is unknown, and it is impossible to ascertain the dimensions of the craft. Dr. Robinson concludes that it was an oblong house of three stories, with a flat or slightly inclined roof, a door in the side, and one or more windows in the roof. Many nations

have the common tradition of the preservation of their ancestors in an A. or some vessel which would float on the water. The A. of bulrushes was really of papyrus reed, of which Pliny says the Egyptians "weave boats;" such boats were light and noted for swiftness. The slime, with which the A. of B. was covered, was for the purpose of keeping out the water.

ARKANSAS, a s. central state and the 12th in order of admission; between lat. 33° and 36° 30' n.; long. 89° 45' and 94° 40' w.; bounded on the n. by Missouri; on the e. by Missouri, and separated from Tennessee and Mississippi by the Mississippi river; on the s. by Louisiana; on the s.w. by Texas; and on the w. by Indian territory; length from n. to s. about 242 m.; av. breadth, 225 m.; land area, 53,045 sq. m. or 33,948,800 acres; water area, 805 sq. m. It is popularly called "the Bear State."

HISTORY.—The name A., pronounced Ar'-kansaw, was that of an Indian tribe found by the first explorers within the limits of the present state. About 1685, Frenchmen who had come with or followed Bienville settled at Arkansas Post. A. formed a part of Louisiana territory till 1812; then was included in Missouri territory till March 2, 1819, when it was organized as A. territory, including Indian territory. In 1836, June 15, it became a state. In 1861, Feb. 8, the state officers seized the arsenal at Little Rock; on April 23, Fort Smith, and on April 24, the arsenal at Napoleon. A convention met on May 6, and passed the ordinance of secession, 69 to 1. The confederates were defeated at Pea Ridge or Elk Horn, March 6-7, 1862, and at Prairie Grove, Dec. 7. Helena was occupied by union forces, and in 1863, Jan. 11, Arkansas Post was captured, as was Little Rock, Sept. 4. In 1863, Oct. 30, union delegates from 20 cos. met at Fort Smith to take steps to reorganize the state government, and in 1864, Jan. 8, a larger convention met at Little Rock, when a constitution was formed, which was accepted by the people, March 14-16, by 12,177 to 226 votes, but was not accepted by congress. Under the reconstruction act of 1867, A. and Mississippi were constituted the 4th military district, and by order of Gen. Ord a registration of voters was made, and delegates were elected to a constitutional convention. This met, Jan. 7, 1868, at Little Rock, and framed the present constitution, which was ratified, March 13, by a small majority. On June 22d the state was readmitted to the union. In April, 1874, an armed collision occurred between the adherents of the candidates for governor; federal aid was invoked, and Pres. Grant formally recognized Baxter, Republican, as the lawful governor. In June the people voted to hold a convention to revise the constitution of 1868; accordingly a new one was framed, and the organic law of the state restored, in the main, to its antebellum state. This constitution was ratified Oct. 13 by a majority of 53,890 votes out of 103,504 cast.

TOPOGRAPHY.—The surface in the e. is level, broken by swamps and small lakes, and along the Mississippi subject to overflow. The central portion is rolling; in the w. and n. w. are the Ouachita, Boston, Ozark, and other ranges (1500-2000 ft.); isolated peaks approach 3000 ft. Besides the Arkansas (q.v.), the chief rivers are the St. Francis, Big Black, White, Ouachita, and Saline. The Red River forms the s. w. boundary for a short distance; the St. Francis, part of the boundary between A. and Missouri. The Big Black, 350 m. long, is navigable for about 100 m.; White River, 600 m., is navigable for small steamboats for 260 m. Hot and mineral springs are numerous. The celebrated Hot Springs of Arkansas in Garland County, southwest of Little Rock, have a world-wide reputation for rheumatism and similar diseases. They are owned by the United States government, and comprise about one hundred springs, varying in temperature from 93° to 160° Fahr. The government has established a large Army and Navy Hospital here for disabled officers and soldiers.

GEOLOGY AND MINERALOGY.—The principal formations are the lower Silurian in the n.; the sub-carboniferous, overlaying this, on the s., itself passing under the coal measures; the cretaceous in the s.w.; and the tertiary (marl beds and eocene limestones), overlaid by quaternary sands and clays. A deposit of semi-bituminous coal, covering an area of 12,000 sq. m., extends from the w. border of the state, eastward, over 12 cos. Whetstone rocks, from which the finest grade of whetstone and razor-hones are made, cover a large area in Garland and adjoining counties. The manganese ore found in this state is the most valuable in the Union, being especially adapted to the manufacture of Bessemer steel. Marble, equal to the Tennessee marble, occurs in large quantities. There are found also antimony, iron ore, lead, alabaster, copper, granite, free-stone, kaolin, lignite, marl, oilstone, mineral ochres, slate, rock crystal, silver, gold, and salt.

ZOOLOGY.—The fauna include the deer, Texan wolf, bear, panther, wildcat, raccoon, peccary, beaver, wild hog, and coyote; the eagle, hawk, wild turkey, grouse, quail, and parouquet; the shad, bass, pickerel, wall-eyed pike, perch, and catfish; the moccasin snake, rattlesnake, and alligator.

BOTANY.—The uplands of the Mississippi and St. Francis produce the black walnut, hickory, ash, elm, white oak, gum, maple, pecan, haw, and sassafras; the lands annually overflowed, the gum, oak, hickory, etc.; the deep swamps, ash, elm, hickory, cypress, water oak, and willow. In the Arkansas valley are found the red cedar, cotton-wood, maple, willow, red, pin, and chestnut oak, mulberry, and papaw. Among other trees and shrubs are the butternut, Spanish oak, tulip-tree, persimmon, holly, laurel, palmetto, and osage orange.

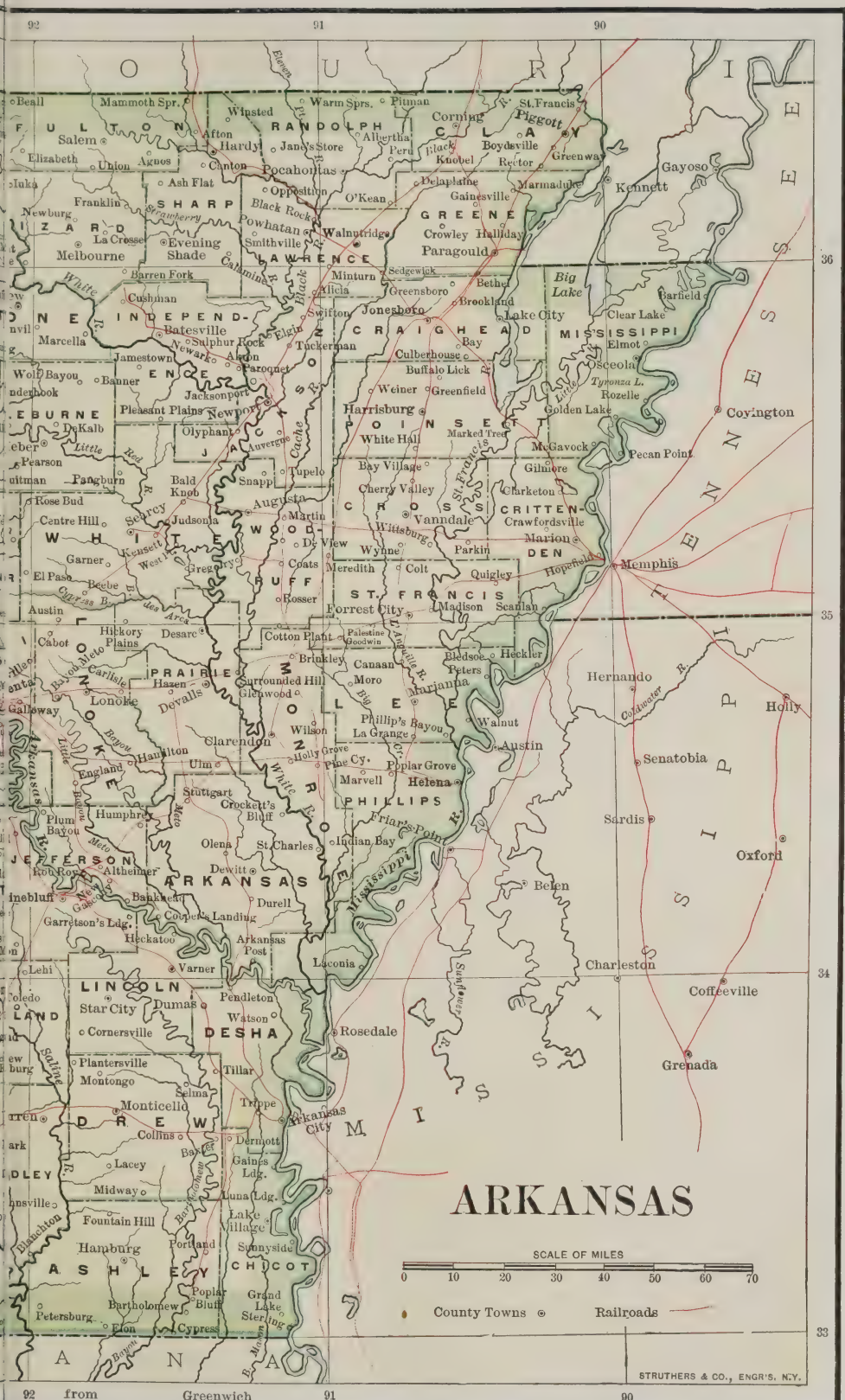
SOIL AND CLIMATE.—In the uplands of the n.e. part of the state, a light sandy soil predominates; in the lowlands subject to overflow a black friable soil called "buckshot."

AREA AND POPULATION OF ARKANSAS BY COUNTIES.

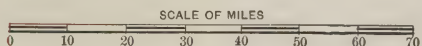
(ELEVENTH CENSUS : 1890.)

	Area in Square Miles.	Population.		Area in Square Miles.	Population.
Arkansas.....	1,062	11,432	Lincoln.....	536	10,255
Ashley.....	927	13,295	Little River.....	547	8,903
Baxter.....	545	8,527	Logan.....	642	20,774
Benton.....	891	27,716	Lonoke.....	769	19,263
Boone.....	672	15,816	Madison.....	892	17,402
Bradley.....	755	7,972	Marion.....	631	10,390
Calhoun.....	575	7,267	Miller.....	648	14,714
Carroll.....	659	17,288	Mississippi.....	803	11,635
Chicot.....	760	11,419	Monroe.....	696	15,336
Clark.....	905	20,997	Montgomery.....	834	7,923
Clay.....	568	12,200	Nevada.....	616	14,832
Cleburne.....	558	7,884	Newton.....	838	9,950
Cleveland.....	693	11,362	Ouachita.....	732	17,033
Columbia.....	825	19,893	Perry.....	560	5,538
Conway.....	493	19,459	Phillips.....	650	25,341
Craighead.....	668	12,025	Pike.....	620	8,537
Crawford.....	582	21,714	Poinsett.....	720	4,272
Crittenden.....	614	13,940	Polk.....	935	9,283
Cross.....	672	7,693	Pope.....	795	19,458
Dallas.....	676	9,296	Prairie.....	658	11,374
Desha.....	733	10,324	Pulaski.....	883	47,329
Drew.....	802	17,352	Randolph.....	622	14,485
Faulkner.....	623	18,342	St. Francis.....	612	13,543
Franklin.....	672	19,934	Saline.....	622	11,311
Fulton.....	649	10,984	Scott.....	930	12,635
Garland.....	622	15,328	Searcy.....	768	9,664
Grant.....	617	7,786	Sebastian.....	600	33,200
Greene.....	591	12,908	Sevier.....	547	10,072
Hempstead.....	742	22,796	Sharp.....	570	10,418
Hot Spring.....	626	11,603	Stone.....	619	7,043
Howard.....	629	13,789	Union.....	1,138	14,977
Independence.....	736	21,961	Van Buren.....	998	8,567
Izard.....	547	13,038	Washington.....	927	32,024
Jackson.....	619	15,179	White.....	1,137	22,946
Jefferson.....	840	40,881	Woodruff.....	577	14,009
Johnson.....	612	16,758	Yell.....	936	18,015
Lafayette.....	497	7,700			
Lawrence.....	574	12,984	Total.....	53,045	1,128,179
Lee.....	606	18,886			





ARKANSAS



County Towns @ Railroads

STRUTHERS & CO., ENGRS. N.Y.

In central, n. and n.w. A. much red loam occurs, and many portions are too sterile for any use but grazing. The higher lands of the Arkansas valley, from Indian territory to Little Rock, are composed of a dark sandy loam; while below the city a sandy, sometimes clayey soil borders the river, joined on the s. by black, sandy, and buckshot soils, the richest in the state, and yielding from 2000–3000 lbs. of seed cotton per acre. The bottom lands of the Red River valley contain a black sandy loam, or red, sticky clay. A yellow loam is characteristic of some of the southern cos. Except in the swampy districts, the climate is pleasant and healthful; mean summer temperature, 79.83°; winter, 43°. The snowfall is light, and prolonged droughts are unknown; av. annual rainfall, Fort Smith, 40.36 in.; Washington, 54.50.

AGRICULTURE.—The lowlands of the east and south, especially the river valleys, are remarkably fertile, producing over 950,000 lbs. of tobacco and 830,000 bales of cotton annually. On the long stretches of prairies between Little Rock and Memphis are raised great numbers of live-stock, valued at \$34,021,940. The hilly section of the southwest is also adapted to cattle-raising, as well as to fruits and the cereal crops. The farming lands of the uplands produce immense crops of corn, wheat, and oats, valued about \$88,000,000 annually, and in recent years fruit-growing has received much attention, especially in the northwest, where apples, peaches, grapes and other small fruits of the finest varieties are most successfully grown. Other important exports in the state are lumber, sweet potatoes, hay, sorghum and molasses, honey and wine.

AGRICULTURAL PRODUCTIONS IN 1896.

Corn,	29,723,854 bush.,	value	\$10,997,826	Potatoes,	1,468,274 bush.,	value	\$778,185
Wheat,	1,260,720 "	"	895,111	Hay,	187,632 tons,	"	1,414,745
Oats,	5,075,456 "	"	1,573,391	Tobacco,	1,327,500 lbs.,	"	146,025
Rye,	22,940 "	"	16,058				

MANUFACTURES.—The manufactures of the state are small and insignificant as compared with the amount of raw material, much of which is now shipped to other states. The principal manufactures are brick and tile, cotton-seed oil and cake, flour, lumber, foundry and machine-shop products, saddlery and harness. Over \$60,000,000 capital is invested, of which the flour and lumber mills employ a large percentage.

COMMERCE.—The foreign commerce is carried on chiefly through the port of New Orleans. The annual export of cotton is nearly \$30,000,000. From the forests come about \$20,000,000 worth of lumber annually, large quantities of which go to Europe, while vast shipments of yellow pine, known as "Georgia pine," go to the northern states. The many navigable rivers are favorable to domestic commerce.

BANKS.—In Oct., 1896, there were 9 national banks (capital \$1,220,000, reserve \$489,123), and 21 state banks (capital \$888,682, resources \$2,961,423, surplus \$413,368).

RAILROADS.—The first railroad in the state was not completed when the Civil War broke out in 1861, but in 1896 there were over 2500 miles of track. The Missouri-Pacific system has a number of lines running in different directions through the state. The St. Louis and Southwestern Railway system, known as the "Cotton Belt Route," and whose main line crosses the state diagonally from northeast to southwest, has also a number of branches. The St. Louis and San Francisco Railroad, crossing the northwestern section of the state, has a large and increasing trade; this road passes through the Boston mountains by means of long tunnels and galleries.

RELIGION, EDUCATION, ETC.—The leading denominations are Baptist, Methodist, Presbyterian, Union, and Roman Catholic. In 1895 there were 448,941 children of school age; 299,292 pupils enrolled in public schools; 5,254 school buildings; 6,920 teachers; public school property valued at \$2,113,123; and expenditure, \$1,291,108. For normal training there were 5 public and 3 private schools. The institutions for higher education included the Arkansas Industrial University at Fayetteville; Shorter University, Arkadelphia; Little Rock University, Little Rock; Arkansas College, Batesville; Arkansas Cumberland College, Clarksville; Hendrix and Central Baptist Colleges, Conway; Philander Smith College, Little Rock; Ouachita Baptist College, Arkadelphia; Baptist College, Mountain Home; Franklin Female College, Ozark; Buckner College, Witcherville; Subiaco College, Spielerville; Searcy College, Searcy; and Arkansas Female College, Little Rock. The institutions for the colored race were Shorter University (Af. Meth.); Arkadelphia Academy (Bapt.); Arkansas Baptist College; Philander Smith College (Meth.); Arkansas Normal College, Pine Bluff (non-sectarian); and Southland College, Southland (Friends). In 1896 there were 250 periodicals, 26 daily and 198 weekly; and 1,742 post-offices.

GOVERNMENT, ETC.—The capital is Little Rock. One year's residence in the state, six months in the county, and thirty days in the township, village or ward entitles one to vote. Registration of voters is prohibited in this state by constitutional provision. Elections are held every two years on the first Monday in September. New ballot laws based on the Australian system went into effect in 1891. There are thirty-two State senators, each elected for four years, and one hundred representatives, each elected for two years; they receive \$6 per day and .20 mileage. The legislature meets biennially. All state officers are elected for two years.

The judiciary consists of the Supreme Court with five judges, each elected for six years; a chancery court and sixteen circuit courts. Each county has a probate and a county court; each township two magistrates' courts. The legal rate of interest is six per cent.; ten per cent. is allowed by contract. Judgments outlaw in ten years, notes in five years, and open accounts in three years. The principal causes for divorce are, wilful desertion for one year, habitual drunkenness, and conviction of felony or other infamous crimes.

A. has two senators and five representatives in Congress. The electoral votes

have been cast as follows: in 1836 and 1840, for Van Buren and Johnson, 3; 1844, Polk and Dallas, 3; 1848, Cass and Butler, 3; 1852, Pierce and King, 4; 1856, Buchanan and Breckenridge, 4; 1860, Breckenridge and Lane, 4; 1864, no vote; 1868, Grant and Colfax, 5; 1872 (6 votes not counted); 1876, Tilden and Hendricks, 6; 1880, Hancock and English, 6; 1884, Cleveland and Hendricks, 7; 1888, Cleveland and Thurman, 7; 1892, Cleveland and Stevenson, 8; 1896, Bryan and Sewall, 8.

The National Guard contained (1897) 945 officers and men, chiefly infantry; the total force liable to military duty was 205,000.

FINANCES.—In June, 1896, the recognized bonded debt and overdue interest thereon aggregated \$4,433,995, about one-half of which was held by the United States Government, against which the state had claims. Assessed valuation (1895), \$173,758,764.

PUBLIC INSTITUTIONS.—The state institution for the blind, that for deaf mutes, and the penitentiary are situated at Little Rock.

POPULATION.—In 1810, 1062, white; 1820, 14,255; 1840, 97,574; 1860, 435,450—111,115 slaves; 1880, 802,525—210,666 colored; Indians, 195; foreign born, 10,350; males, 416,279. Pop. 1890, 1,128,179. There are 75 cos.; for pop. 1890, see census tables vol. XV. Largest cities, 1890, are: Little Rock, 25,874; Fort Smith, 11,311; Hot Springs, 8086; Eureka Springs, 3706; Helena, 5189, and Texarkana, 3528.

ARKANSAS, a co. in eastern Arkansas, on the Arkansas and White rivers; 1062 sq. m.; pop. '90, 11,432. Co. seat, De Witt.

ARKANSAS CITY. A town in Cowley county, Kansas, at the junction of the Arkansas river and Walnut Creek, 268 miles southwest of Kansas city and 14 m. s. of Winfield. It was settled in 1870. It has good railroad connections by the Atchison, Topeka and Santa Fé, Missouri Pacific, and the St. Louis and San Francisco railroads. A canal takes water from the Arkansas, four miles above the city, and furnishes ample water-power for manufacturing. Flour, lumber, chairs, windmills, mattresses, and other articles are produced, and the city has most of the trade of the Indian agencies and military posts in Indian territory. It has churches, banks, newspapers, public schools, and contains the machine shops of the A. T. & S. F. railroad. Pop. 1890, 8347.

ARKANSAS' RIVER, next to the Missouri the largest affluent of the Mississippi. It is 2000 m. long, rising in the Rocky mountains on the borders of Utah, and joining the "father of waters" in lat. 33° 54' n., and long. 91° 10' w. Notwithstanding this, however, the A. is navigable for steamboats, during nine months of the year, to a distance of 650 m. from its mouth.

ARKLOW, a t. in the s.e. corner of Wicklow co., Ireland, in lat. 43° 40' n., and long. 4° 38' w., at the mouth of the river Avoca, which is crossed here by a bridge of 19 arches. Near the town is Shelton abbey, the seat of the earl of Wicklow. Pop. '81, 4777.

ARK OF THE COVENANT, **ARK OF THE TESTIMONY**, or **ARK OF JEHOVAH**, one of the most important parts of the furniture of the tabernacle, which, by divine direction, the Israelites constructed in the wilderness, and afterwards of the temple built by Solomon at Jerusalem. A description of it is to be found in Exodus xxv., in the command given to Moses for its construction; and also in Exodus xxxvii., from which it appears that it was a chest of shittim-wood (very generally supposed to be the wood of a species of acacia, but by some regarded as more probably that of the wild-olive), overlaid with gold within and without, two cubits and a half in length, one cubit and a half in breadth and in height—that is, according to the common estimate of the length of the cubit, 3 ft. 9 in. in length, and 2 ft. 3 in. in breadth and height—the lid being formed entirely of pure gold, with a crown or raised border of gold round about. Within the ark was deposited the "testimony," consisting of "the two tables of the law," i.e., the stone tablets upon which the ten commandments were inscribed. The golden lid of the ark was called the *mercy-seat* or *propitiatory*; above it were the *cherubims* (see *CHERUB*), made of the same piece of gold with it, and between them the place of the *Shechinah* or manifestation of the divine presence. The ark had also golden rings, through which passed staves of shittim-wood, overlaid with gold, for carrying it in the journeyings of the Israelites, concerning which very particular rules were laid down (see Numbers iv.). Whilst being carried from one place to another, it was covered first with a "covering of badgers' skins," and above this with "a cloth wholly of blue;" and in the tabernacle and temple it was put into the "most holy place," into which the high-priest alone was to enter upon the "day of atonement." The ark was called the A. of the C., because it was the appointed symbol of the presence of God as the God of Israel, and of his covenant with his people. The things of the Jewish dispensation being regarded as typical, and the Jewish religion as essentially one with the Christian, the ark is commonly regarded as a type of Christ; the excellency and unchangeableness of the moral law, as indicated by the place assigned to it within the ark, which, however, sprinkled with the blood of typical sacrifice, was interposed between it and men, who, having transgressed it, were exposed to its curse; and the mercy-seat, in like manner sprinkled with the blood of sacrifice, was interposed, as it were, between the law and God, who is represented in the Old Testament as "dwelling between the cherubims," and thence shining forth as the God of mercy, favorable to his worshipers. A complete harmony is thus made out between these Old Testament types and Christian theology.

ARKONA, the n.e. promontory of the island of Rügen, in the Baltic, almost the most northern extremity of Germany.

ARK WRIGHT, Sir RICHARD, celebrated for his inventions in cotton-spinning, was b. at Preston, in Lancashire, Dec. 23, 1732. Of humble origin, the youngest of 13 children, and bred to the trade of a barber, his early opportunities of cultivation were exceedingly limited. In 1760, he gave up his business as a barber in Bolton, and became a dealer in hair. A secret process for dyeing hair, said to have been discovered by himself, increased considerably the profits of his trade. Very little is known regarding the first movements of his mind in the direction of mechanical invention. His residence in the midst of a cotton-spinning population naturally led him to take an interest in the processes used in that manufacture. That the development of his mechanical ingenuity was not, however, due to circumstances, is sufficiently proved by the fact that his first effort was an attempt to discover the perpetual motion. Having no practical skill in mechanics, he secured the services of a watchmaker, named Kay, to assist him in the construction of his apparatus. About 1767, he seems to have given himself wholly up to inventions in cotton-spinning. In the following year he removed to Preston, where he set up his first machine, the celebrated *spinning-frame*, consisting chiefly of two pairs of rollers, the first pair moving slowly in contact, and passing the cotton to the other pair, which revolved with such increased velocity as to draw out the thread to the required degree of fineness. No previously invented machinery had been able to produce cotton thread of sufficient tenuity and strength to be used as warp. An invention, indeed, by Mr. Charles Wyatt of Birmingham, which was patented in 1738, but never succeeded, deprives A. of the honor of having been the first to use rollers in spinning; but there is no reason to believe that he owed anything to this previous attempt. The first suggestion of the idea, he said, was derived from seeing a red-hot iron bar elongated by being made to pass between rollers. At this time A. was so poor that he needed to be furnished with a suit of clothes before he could appear to vote at an election as a burgess of Preston. Soon after, he removed to Nottingham, to escape the popular rage, which had already driven Hargreaves, the inventor of the *spinning-jenny*, out of Lancashire. Here he fortunately fell in with Mr. Jedidiah Strutt of Derby, the celebrated improver of the *stocking-frame*, who entered into partnership with him, in conjunction with his partner Mr. Need. In 1769, A. set up his first mill, driven by horses, and took out a patent for his invention. In 1771, he set up a larger factory, with water-power, at Cromford, in Derbyshire. The remarkable capabilities of his mind were strikingly evinced in the management of the great business which now demanded his undivided attention. Without personal experience, and with no model to guide him, he introduced a system of management so admirable that it was afterwards universally adopted, and has never been materially improved. In 1775, he took out a fresh patent for various additional improvements in machinery. The success attending these undertakings stimulated rivals to invade his patent; and to such an extent did other cotton-spinners use his designs, that he was obliged, in 1781, to prosecute at once nine different manufacturers. The first action against Col. Mordaunt, backed by a strong combination of Lancashire manufacturers, was lost, solely on the ground that his description in his specification was not sufficiently clear and distinct. The other actions were abandoned; and, in the following year, A. published a pamphlet containing a statement of his case. In a new trial, in 1785, he obtained a favorable verdict. The whole question, however, was brought finally before the court of king's bench, a few months after, when A.'s claim to the inventions patented was for the first time called into dispute. On the doubtful evidence of a person named Highs, or Hayes, combined with that of A.'s old assistant Kay, the jury decided against him, and his patent was annulled. This was but the formal outcome of an opposition which had from the beginning marked out A. as an object of hostility. The manufacturers at first combined to discountenance the use of his yarn. When the yarn was made into calicoes, and parliament was petitioned to lessen the duty on that cloth, they strenuously opposed the measure, but in vain. Popular animosity was also excited against the man who abridged labor, but in reality increased its sphere; and on one occasion, a large factory belonging to A. was destroyed in the presence of a powerful military and police force, without a word of interference from the magistrates. The energy and good sense of A., however, triumphed over all opposition; and at the time of his death, in 1792, the value of his property amounted to about half a million sterling. In 1786, he was appointed high-sheriff of Derbyshire; and on the occasion of presenting an address to the king, congratulating him on his escape from the knife of the maniac Margaret Nicholson, he received the well-merited honor of knighthood. A severe asthma had pressed upon him from his youth; and a complication of disorders, the result of his busy sedentary life, terminated his honorable career at the comparatively early age of 60.

ARLES (anciently, *Arelate*), one of the oldest towns in France, situated on the left bank of the principal branch of the Rhone, after it has divided into a delta, in the department of Bouches du Rhone. Pop., '86, of the municipality, 23,491; of the town, 15,560. A. carries on a considerable trade. It has manufactures of silk, hats, tobacco, brandy, &c., and forms a market for the productions of the surrounding country. It also possesses a college, a naval school, a public library, and a superb museum of antiquities in natural history. The marshes which rendered the district so unhealthy for a long time, have been considerably drained, and a canal has been formed which connects it with the south coast. Railways also bring it into easy communication with Marseilles, Avignon, Nîmes, Montpellier, &c. Under the Romans, it was the seat of a prefect; afterwards, for

some time, the residence of the Gothic king, Eurich; and, in 879, was the metropolis of the kingdom of Arelate (see BURGUNDY). In the early Christian times, several important synods were convened here (814, 354, 452, and 475 A.D). Among the antiquities of A. are a magnificent amphitheatre, which could contain between 20,000 and 30,000 spectators; the ruins of a theater, also of a palace of Constantine the Great; an obelisk of granite, dug up from the mud of the Rhone in 1389; a burial-place (the Elysian Fields) used by the Romans; and a mediæval cathedral, in the old Roman style, with a splendid portal arch.

ARLINCOURT, VICTOR, Viscount d', 1789-1856; a French author. He wrote *Charlemagne, ou la Caroleide*, an epic poem; and *Le Solitaire*, a novel; both successful.

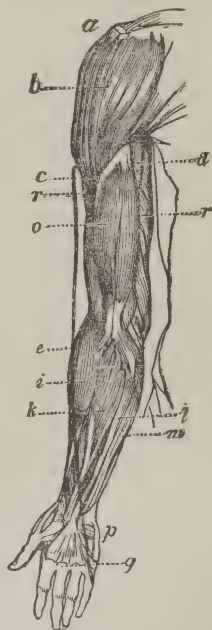
ARLINGTON, a town of Middlesex co., Mass., on the Boston and Maine railroad, 6 m. n. w. of Boston. Market-gardening and ice-cutting are leading occupations. A. has a public library, banks, churches, and some manufacturing business, including piano cases, ice tools, picture frames and drugs. Till 1867 it was called West Cambridge. Pop. '90, 5629.

ARLON (anc. *Orolanum*), a t. of Belgium, the capital of the province of Luxembourg, 24 m. w.n.w. from Luxemburg. It is a neat and prosperous town, and has a considerable trade in corn, woolen stuffs, leather, iron, etc. It has frequently suffered the ravages of war. The French pillaged it in 1793, after a victory won in its neighborhood over the Austrians. Pop. 8300.

ARM, the upper extremity of the human body, consists of two portions — the A., strictly so called, and the forearm; the former having one bone, the humerus, which moves freely by a globular head upon the scapula, forming the shoulder-joint; and the latter having two bones, the radius and ulna, which move on the lower end of the humerus, forming the elbow-joint, and below, with the carpus, forming the wrist.

The humerus is attached by a loose capsular ligament to the scapula, allowing great freedom of motion; and were it not for the muscles, would be frequently dislocated, but it is supported by muscles on all sides except underneath or opposite the armpit, into which the head of the bone is often driven. The roundness of the shoulder is due to the head of the humerus, so that any displacement is accompanied by a flattening, which at once suggests the nature of the accident. On the shoulder there is a large triangular muscle, the deltoid, which lifts the A. from the side. At the back is the triceps, which extends the forearm; in front are two muscles which flex or bend it — the biceps, and the brachialis anticus; and on each side below are muscles passing to the forearm and hand; while on each side, above the great muscle of the back (*latissimus dorsi*) and that of the chest (the *pectoralis major*) are inserted on each side of a groove, wherein lies one of the tendons of the biceps (q.v.). The motions of the ulna are flexion or bending effected by the biceps, and extension or straightening by the brachialis anticus and the triceps, its projections being received in these movements into corresponding depressions on the humerus. The movements of the hand are principally due to the radius, the head of which rolls upon the ulna, thereby turning the palm downwards (pronation), or restoring the palm upwards (supination), these movements being effected by muscles, two for each movement, which, taking their fixed points from the humerus and ulna, pull the radius round on the latter. The elbow-joint is ginglymoid or hinge-like, and therefore has strong lateral ligaments; but it is extremely liable to dislocations, often accompanied by fracture, especially in the young. The accident being followed by severe inflammation, the joint is very apt to stiffen, thereby seriously (see ANKYLOSIS) deteriorating from the usefulness of the limb; it is, therefore, inadvisable to keep the limb too long in any one position after such an injury. This joint is also very liable to disease; but as this is confined to the ends of the bones, the small portions of the latter affected can be readily cut out, and the arm be restored to usefulness and mobility in a few weeks.

The upper extremity is supplied with blood by the brachial artery, the continuation of the axillary trunk. The veins collect into large superficial trunks, which unite at the bend of the elbow, at which situation one is frequently selected for venesection, and then pass on to the axillary, on the outside by the cephalic vein, on the inner side by the basilic.



HUMAN ARM.

abc, deltoid muscle; d, coraco brachialis muscle; r, r, triceps; e, i, extensors of wrist and long supinator of the hand; km, flexor of fingers and radial and ulnar sides of the wrist, and l, palm of the hand, or palmaris longus; p, palmaris brevis; q, palmar fascia; o, biceps.

The nerves pass down as large cords by the side of the artery, and diverge from it to their ultimate distributions; the musculo-spiral soon passing round at the back to appear on the outside, and become the radial and posterior interosseous nerves; the ulnar running behind the internal condyle, for which it has obtained the term "funny bone," from the electric-like thrill which passes along the arm when the nerve is struck or pressed. The median, as its name implies, keeps a middle course with the artery.

In wounds of the forearm, the bleeding is often excessive, but may be at once controlled by pressure on the brachial artery, on the inner side of the biceps.

The arm affords excellent illustrations of some of the principles of mechanics. The insertion of the muscles so near, as will be seen, to the fulcra or centers of motion, involves a loss of power in the usual sense of the word; there is, however, a corresponding gain in velocity at the end of the lever; and for most of the purposes to which the hand is put, agility is of far greater moment than dead strength.

ARM. In maritime language, besides the obvious application to weapons of warfare, this term is applied to each extremity of a bibb, or bracket, attached to the mast of a ship for supporting the trestle-trees. The same name is also given to a part of the anchor. See **ANCHOR**.—In military language, the infantry, the cavalry, the artillery, and the engineers are each called "an A." of the service—equivalent to branch or department.

ARMADA, a Spanish word signifying simply an armed force, but applied especially to the great Spanish fleet which invaded England in 1588. The king of Spain, Philip II., had resolved to strike a decisive blow at the Protestant interest, by conquering England, which Pope Sixtus V. had made over to him. The ports of Spain, Portugal, and other maritime dominions belonging to him, had long resounded with the noise of his preparations, and the most eminent Catholic soldiers from all parts of Europe flocked to take a share in the expedition. The marquis of Santa-Croce, a sea officer of great reputation and experience, was destined to command the fleet, which consisted of 130 vessels, of greater size than any that had been hitherto seen in Europe. The duke of Parma was to conduct the land forces, 20,000 of whom were on board the ships of war, and 34,000 more were assembled in the Netherlands, ready to be transported into England; so that, as no doubt was entertained of success, the fleet was ostentatiously styled the invincible A. Nothing could exceed the terror and consternation which seized all ranks of people in England upon the news of this terrible A. being under sail to invade them. A squadron of not more than thirty ships of the line, and those very small in comparison, was all that Elizabeth had to oppose it by sea; and it was considered impossible to make any effectual resistance by land, as the Spanish army was composed of men well disciplined and long inured to danger. But although the English fleet was much inferior in number and size of shipping to that of the enemy, it was much more manageable, while the dexterity and courage of the mariners were greatly superior. Lord Howard of Effingham, a man of great valor and capacity, took upon him, as lord high admiral, the command of the navy; Drake, Hawkins, and Frobisher, the most renowned seamen in Europe, served under him; while another squadron, consisting of 40 vessels, English and Flemish, commanded by lord Seymour, lay off Dunkirk, in order to intercept the duke of Parma. Such was the preparation made by the English; while all the Protestant powers of Europe regarded this enterprise as the critical event which was to decide forever the fate of their religion. In the meantime, while the Spanish A. was preparing to sail, the admiral, Santa-Croce, died, as likewise the vice-admiral, Paliano; and the command of the expedition was given to the duke of Medina Sidonia, a person utterly inexperienced in sea affairs; these unexpected circumstances served, in some measure, to frustrate the design. Some other accidents also contributed to its failure. Upon leaving the port of Lisbon, the A. next day met with a violent tempest, which sank some of the smallest of the ships, and obliged the rest to put back into the harbor. After some time spent in refitting, the Spaniards again put to sea, where they took a fisherman, who gave them intelligence that the English fleet, hearing of the dispersion of the A. in a storm, had returned to Plymouth, and that most of the mariners were discharged. From this false intelligence, the Spanish admiral, instead of going to the coast of Flanders, to take in the troops stationed there, resolved to sail directly to Plymouth, and destroy the shipping laid up in the harbor. But Effingham was very well prepared to receive him, and had just got out of port, when he saw the Spanish A. coming full sail towards him, disposed in the form of a half-moon, and stretching seven miles from the one extremity to the other. The English admiral, seconded by Drake, Hawkins, and Frobisher, attacked the Spaniards at a distance, pouring in their broadsides with admirable dexterity. They did not choose to engage the enemy more closely, because they were greatly inferior in number of ships and guns, as well as in weight of metal; nor could they pretend to board such lofty vessels without manifest disadvantage. In this action, however, two Spanish galleons were disabled and taken. As the A. advanced up the channel, the English still followed and infested its rear; and as their ships continually increased from different ports, they soon found themselves in a capacity to attack the Spanish fleet more nearly, and accordingly fell upon them while they were taking shelter in the port of Calais. To increase their confusion, Howard selected eight of his smaller vessels, which, after filling them with combustible materials, he sent one after another, as if they had been fire-ships, into the midst of the enemy. The Spaniards,

taking them for what they seemed to be, immediately bore off in great disorder; while the English, profiting by their panic, captured or destroyed about twelve ships. The duke of Medina Sidonia, being thus driven to the coast of Zealand, held a council of war, in which it was resolved that, as their ammunition began to fail, as their fleet had received great damage, and as the duke of Parma had refused to venture his army under their protection, they should return to Spain by sailing round the Orkneys, as the winds were contrary to their passage directly back. Accordingly, they proceeded northward, and were followed by the English fleet as far as Flamborough Head, where they were terribly shattered by a storm. Seventeen of the ships, having 5000 men on board, were afterwards cast away on the Western isles and the coast of Ireland. Of the whole A., 53 ships only returned to Spain, and these in a wretched condition. A medal was struck by Elizabeth bearing the inscription *Deus flavit, et dissipati sunt*, "God blew and they were scattered."

ARMADIL'LO, *Dasypus*, a genus of mammalia of the order *edentata* (i.e., toothless)—not, however, truly toothless, but having feeble teeth destitute of true roots, and set apart from each other, and so that those of the one jaw fit into the interstices of those of the other. The number of the teeth is different in different species. The muzzle is elongated, and the tongue smooth and slender, with a glutinous saliva, adapted to the capture of ants and other insects, after the manner of the ant-eaters, but not long and extensible, like theirs. The limbs are short and strong, as are also the claws, and the animals have a great aptitude for digging and burrowing, by means of which they seek to shelter themselves from enemies—burrowing in sand or soft earth with such rapidity that it is almost impossible to dig them out, and indeed it can only be done by persevering till they are exhausted. But that which peculiarly distinguishes the A., and in which this genus differs from all the other mammalia, except the *chlamyphorus* (q.v.), is the bony armor with which the body is covered, and which consists of polygonal plates not articulated, united on the head to form a solid covering, and similarly to form solid bucklers over the shoulders and the haunches; and between these, disposed in transverse bands, which allow of freedom of motion to the body, similar bands in most species protecting also the tail. Armadillos feed not only on insects, but on vegetable and animal food of almost every kind, which by decomposition or otherwise has acquired a sufficient softness. Some of them prefer vegetable food, others delight chiefly in carrion. They are all natives of the warm and temperate parts of South America, in the woods and pampas of which they are found in immense numbers. They are timid and inoffensive, although, when they are incautiously assailed, injury may be received from their claws. Their flesh is esteemed a delicacy, particularly that of the species which feed chiefly on vegetable food. The largest species is fully 3 ft. long, exclusive of the tail; the smallest not above 10 in. The species are numerous, and the genus has been divided into a number of sub-genera, which some naturalists elevate into genera, naming the family *loricata* (i.e., mailed). To this family belongs also the genus *chlamyphorus*, also South American. Fossil remains of gigantic extinct armadillos have been found in the pleistocene strata of South America, forming the genus *glyptodon* of Owen, so named from the fluted teeth.

ARMADIL'LO is also the scientific name of a genus of *crustacea* of the order *isopoda* of Cuvier. This is one of the genera usually included under the popular name of woodlouse, and one of which (*porcellio*) is very generally known by that of slater. The armadillos derive their name from the scaly armor of their body, in which an analogy is found to the mailed quadrupeds of South America. They have, in a remarkable degree, the power of rolling themselves into a ball, when alarmed, so as to expose nothing but the plates of the back, and have thence received the name of pill beetles. Like some of the other closely allied *isopoda*, they were at one time reputed to possess medicinal virtues, now accounted merely imaginary. They were not only used in a dried and pulverized state, but they are said to have been actually swallowed entire as pills. *A. vulgaris* is not uncommon in damp places, under stones, etc., in Britain. See illus., CRUSTACEANS, ETC., vol. IV.

ARMAGED'DON, the name given to the whole or part of the great plain of Esdraelon, which was famous among the Israelites for two great victories—of Barak over the Canaanites, and of Gideon over the Midianites; and for two serious disasters—the death of Saul in battle with the Philistines, and the death of Josiah during an Egyptian invasion. The battles of Gilboa and Megiddo, of Kishon and Jezreel, were fought on this plain. In all history A. has been a famous battle ground from the time of the wars between Assyria and Egypt down to Napoleon's eastern campaign; thence the seer in the book of the Revelation used the name as symbolical of the scene of "the great day of the Almighty," or of the tremendous final conflict between good and evil.

ARMAGH', a small inland co. in Ulster, Ireland; bounded n. by Lough Neagh, e. by Down, s. by Louth, w. by Monaghan and Tyrone. Its greatest length is 32 m., and breadth 20. Area, 512½ sq.m., about four fifths being arable, and a 36th part in woods. The surface is hilly in the s. and undulating in the center, attaining in Slieve Gullion, in the s.w., the height of 1893 feet. The other chief heights are the Newry mountains, 1385 ft.; the Armagh-breague hills, 1200; and Muliash, 1034. The country bordering upon Lough

Neagh is low and boggy, and the Louth plain extends into the s. end of A. The principal rivers navigable in their lower parts are the upper Bann, flowing out of Down n.w. for 11 m. before it enters Lough Neagh; and the Blackwater, which in its lower part separates A. from Monaghan. The rocks of A. are lower silurian in the s. and middle of the co.; the trap of Antrim with the underlying greensand around Portadown; carboniferous limestone in the basins of the Blackwater, and its tributary the Callan; granite in the mountains of the s.e.; and tertiary strata bordering Lough Neagh. The soil is fertile except about 27,000 acres of bog and other waste land. The county contains 313,035 acres in all, the chief crops being oats, wheat, potatoes, turnips, and flax. Large numbers of horses, cattle, sheep, and pigs are raised. The n. and central parts of A. exhibit a dense population, low hills cultivated to the tops, hedgerows, orchards, and thickly-scattered farm steadings. The co. is mostly in the diocese of Armagh. It returns three members of Parliament—two for the co., and one for the city. The chief towns are A., Lurgan, Portadown, and Newry. Pop. '91, 143,289—a large decrease since '71.

ARMAGH, the capital of the co. of A., in a carboniferous limestone district in the n.w. of the county. It is situated around and on a gentle eminence, hence its original name, Ard-Magha, "the high field." It is built of limestone. The cathedral is built of red sandstone, and is cruciform—184 by 119 ft.—and is supposed to occupy the site of that erected by St. Patrick in the 5th century. A Gothic Roman Catholic cathedral occupies the principal height to the n., and the primatial palace that to the s. There is a fever hospital for forty patients, maintained by the late primate, and a lunatic asylum for four counties. A. is the seat of the archiepiscopal see of the primate and metropolitan of all Ireland, who, before the disestablishment of the Irish church, had an income of £12,087 a year. Pop. in '71, 8946, of whom 4691 were Roman Catholics, 3020 Episcopalians, 918 Presbyterians, and the rest of other denominations. The chief manufacture is linen-weaving. A., from the year 495 to the 9th c., was the metropolis of Ireland, the native kings living at Eamania, 2 m. to the w. of the city. It was then renowned as a school of theology and literature—its college being the first in Europe. After the reformation, it suffered severely in the conflicts between the English and Irish; and it contained only three slated houses in 1765, but since then has been rebuilt, and contained in 1891 a population of 8303.

ARMAG'NAC, *Ager Aremonicus*, the old name of a district in the s. of France, which at one time seems to have extended from the valleys of the Pyrenees to the Garonne. It is now included in the departments of Hautes Pyrénées and Gers. The remarkably fertile land, producing grain and the best descriptions of wine, and also favorable for pasturage, is cut up into an extraordinary number of small estates, and divided among numerous petty proprietors. The principal branch of trade is the distillation of the brandy known in commerce as *eau d'Armagnac*, which rivals those of Cognac and Saintonge. The ancient capital is Lectoure, on the river Gers, with abt. 3000 inhabitants. To the s. of it lies Auch, the chief t. of the department of Gers. Pop. '91, 11,700. The people are noted for their simplicity, strength, and bravery; but, on the other hand, they are extremely credulous and ignorant. Formerly, their services were highly valued in times of war. The A. family, descended from the old Merovingian king, Clovis, played an important part in French history.

ARMAG'NAC, BERNARD VII., Count d', constable of France, leader of the "Armagnacs" in 1407. He took possession of Paris, and ruled so oppressively that the populace rose, June 12, 1418, and murdered him with all of his faction whom they could reach.

ARMAG'NAC, JEAN V., Count d', b. about 1420, grandson of Bernard; a notoriously passionate and wicked man. He publicly married his own sister, who had been engaged to Henry VI. of England. Charles VII. took away his possessions, but they were restored by Louis XI., a service repaid by A. in joining the "league for the public good" against the king. He was driven into Aragon, and his estates forfeited, but the king's brother secured them again for him. He was at last captured by the king's soldiers, who put him to death (1473), and, according to tradition, compelled his wife to drink of some drug that killed her and her unborn child.

ARMAMENT is a general name for the weapons of war employed in sea and land battles; all the weapons collectively being called *the A.* of a ship or an army.

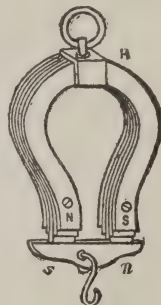
ARMAND, CHARLES, Marquis DE LA ROUARIE, 1756-93; a French soldier, who left France in consequence of fighting a duel about an actress, and volunteered in the American army, receiving the rank of colonel. He fought at Red Bank, also at Camden, under Gates, whose conduct he severely censured. He was at Yorktown, and was made brigadier-general in 1783. Returning to France, he was in the revolution, and was imprisoned in the bastille; but was afterwards a royalist leader in Brittany and Anjou. He d. soon after the execution of Louis XVI., it is said from nervous disease occasioned by the shock of that event.

ARMSBERG, JOS. LUDW., Count of, formerly president of the government in Greece, was b. in lower Bavaria, 1787, and early embraced an administrative and diplomatic career. On the accession of king Louis to the throne, A., who had already occupied several important posts, was summoned to Munich, where, rapidly rising from one dignity to another, he at length became minister of finance and of foreign affairs. In

both capacities he proved active and successful ; but he drew upon himself the hatred of the camarilla by his strenuous opposition to the claims of Rome, as well as by his attempts to identify himself with the decidedly liberal party. The consequence was that, in 1831, he lost his post, and in the same year was appointed ambassador to London, but preferred retiring to his family estate. However, he could not resist the king's repeated request that he would undertake the formation of his son's government in Greece, and accordingly, accompanying young king Otho, A. landed at Nauplia in Jan., 1833. For four years he was at the head of public affairs, and Greece derived many benefits from his administration ; but the heat of party strife and court intrigues led to his dismissal, and he left Greece in Mar., 1837. He died in 1853.

ARMATOLES, a body of Greek militia, first formed under the reign of sultan Selim I. about the beginning of the 16th century. They were intended to preserve the fertile plains from the ravages of the *klephts* (mountain robbers of Thessaly), who had never been entirely conquered by the Turks. The A. themselves were originally klephts, but received their more honorable designation when the porte had metamorphosed them into a sort of military police. The safety of the public roads was intrusted to their care. The whole of northern Greece was divided into sixteen districts (*capitaineries*), each placed under the supervision of a chief of these militia, who, however, had himself to receive orders from a Turkish pasha or Greek bishop. But although the A. frequently suppressed the brigandage of the klephts, they still regarded them in the light of brothers, inasmuch as they had a common origin and faith; both detested the oppressors of their country; and the sentiment of patriotism overruled every other consideration. This sympathy at last appeared to the Turks so dangerous that they grew alarmed, and desired to substitute for the A. the Mohammedan Albanians, who were the implacable enemies of the Greeks, which resolution did not a little to hasten the insurrection which the porte ever dreaded. The moment it broke out, the A. pronounced themselves in favor of the national cause, and in the war of independence that ensued, distinguished themselves by their brilliant exploits.

ARMATURE (*armatura*, armor; Ger. *anker*). The term A. is applied to the pieces of soft iron that are placed at the extremities or poles of magnets to preserve their magnetic power. When magnets are allowed to remain any length of time without such appendages, in consequence of the disturbing influence of terrestrial magnetism they lose considerably in strength; but when they are provided with them their magnetism is kept in a state of constant activity, and thereby shielded from this disturbance. The reason of this is found in two facts well known in the science of magnetism—viz., that when a piece of soft iron is brought into contact with the extremity of a magnet, it is itself induced to become magnetic; and that the unlike poles of two different magnets powerfully attract each other. Referring to the figure, the north pole, N, of the horseshoe magnet, NHS, acting on the armature, *sn*, induces it to become a magnet, having its south pole, *s*, next to N, and its north pole, *n*, at the opposite extremity. The pole, S, by virtue of its magnetic affinity, powerfully attracts the north pole, *n*, thus formed, and adds its own inducing influence to heighten the magnetic condition previously induced in the armature by the pole N. The A., from the combined action of both poles of the horseshoe magnet, is thus converted into a powerful magnet, with its poles lying in an opposite direction to that of the primary poles. The original magnet is, in consequence, brought into contact with one of its own making, the exact counterpart of itself—a condition highly favorable to the maintenance of its strength. It is due to the same mutual attractions that a much larger weight can be suspended from the A. thus placed, than what the single poles can together sustain. Bar magnets may be armed in the same way by laying them at some distance parallel to each other, with their unlike poles towards the same parts, and then connecting their extremities by two pieces of soft iron. When a magnet, such as a compass-needle, is free to take up the position required by the magnetism of the earth, the earth itself plays the part of an armature. An A. is also the revolving part of a dynamo. See **MAGNETS**.



ARMED SHIP, a merchant ship taken into the service of a government for a particular occasion and armed like a ship of war. During the war of the Revolution there were very few men-of-war belonging to the United States ; the very large majority of vessels were private craft fitted up for the special purpose of preying upon the British commerce. In all the wars in which this country has been engaged, armed ships turned into war vessels have done a great deal of service. Particularly was this the case during the civil war, when the government found there were but few regular men-of-war, and that it was necessary to arm almost every available merchant vessel to aid in maintaining the blockade.

ARMENIA, a high table-land on the southern slope of the Caucasus, stretching down towards Mesopotamia. It has had different boundaries in the various centuries of its history. It is the original seat of one of the oldest civilized peoples in the world, the Armenians, who belong to the Indo-Germanic family of nations. Their oldest records contain nothing certain beyond the facts that, in ancient times, they were governed by

Independent kings, but afterwards became tributary to the Assyrians and Medes. That dim period which wavers between myth and history begins, in the case of A., about the middle of the 6th c. B.C., when King Dikran, or Tigranes I. of the Haig dynasty, restored the independence of the kingdom. The last king of this dynasty was slain in battle against Alexander the Great, who conquered the country. After Alexander's death, A. passed through several changes of fortune under the Seleucidæ, who appointed governors over it. Of these, two—Artaxias and Zariadres—made themselves independent of their sovereign, Antiochus the great, during the time when he was engaged in his contest with the Romans, 223–190 B.C. They divided the province into two districts—Artaxias taking A. Major (that part of the country lying e. of the Euphrates), and Zariadres A. Minor (the part to the w. of that river). The dynasty of Artaxias did not reign long; for about the middle of the 2d c. B.C., we find A. major in the possession of a branch of the Parthian Arsacidæ, of which the most powerful king was Tigranes the great, who added to the conquests made by his predecessors in lower Asia and the region of the Caucasus, Syria, Cappadocia, and A. Minor; defeated the Parthians, and took from them Mesopotamia and other countries. He lost all these territories by his war with the Romans, into which he was led by his father-in-law, Mithridates, king of Pontus, in 63 B.C. After this, the assaults of the Romans from the west, ever growing more and more vigorous, and those of the Parthians from the east, hastened the downfall of A. Major. The successors of Tigranes became dependent, partly on the one nation and partly on the other, while internally the nobles broke through the restraints of a feeble monarchy, and claimed the privileges of petty kings. Under Trajan, A. Major was for a short time a Roman province. Its subsequent history exhibited an unbroken series of tumults and wars, of violent successions to the throne, despotic reigns, and rapid decay. In 232 A.D., the province was conquered by the Sassanides, who held possession of it 28 years, until Tiridates III., the rightful heir, was restored to the throne by Roman assistance.

It was about this time that Christianity became the religion of A., which was thus the first nation to embrace the new religion. Tiridates himself had been converted by St. Gregory the illuminator as early as about 300 A.D. The old religion of Armenia had for its basis the doctrines of Zoroaster, with a curious intermixture of Greek mythology, and of ideas peculiar to the country. It is certain that the Armenians worshiped, as their mightiest gods, Aramazt and Mihir (the Ormuzd and Mithras of the old Persians); but they had also a kind of Venus, whom they styled Anaitis, and several other deities, to whom they offered animal sacrifices. This change of creed, however, made no improvement in the political circumstances of the falling state. The Byzantine Greeks on one side, and the Persians on the other, regarded A. as their prey; and in 428, Bahram V. of Persia made A. a province of the empire of the Sassanides, and with the deposition of Artasir the dynasty of the Arsacidæ was brought to a close. The rule of the Sassanides in A. was marked chiefly by their sanguinary but unsuccessful attempts to extirpate Christianity. In 632, the unhappy country was subjected to another form of despotism under the Arabian caliphs, and suffered terribly during their contest with the Byzantine emperors. In 885 A.D., Aschod I., of an old and powerful Armenian family, ascended the throne, with the permission of the caliphs, and founded the third Armenian dynasty—that of the Bagratidæ. Under them A. was prosperous till the 11th c., when divisions and internal strife began to weaken the country; till at length the Greeks, having murdered the last monarch of the Bagratidæ, seized a part of the kingdom, while the Turks and Kurds made themselves masters of the rest—only one or two of the native princes maintaining a perilous independence. In 1242, the whole of A. major was conquered by the Mongols, and in 1472 became a Persian province. Afterwards the western part fell into the hands of the Turkish sultan, Selim II.

The fate of A. Minor was hardly better. The dynasty founded by Zariadres prevailed to the time of Tigranes the Great, sovereign of A. Major, who conquered the country about 70 B.C. Afterwards A. minor was subjugated by the Romans, and made a Roman province. On the division of the empire into eastern and western, it became attached to the former, and shared in all its changes of fortune until near the close of the 11th century. At this time A. minor—which had long been a place of refuge for many who had fled from the rage of the Turks and Persians in the sister province—was again raised to independence by Rhupen (a refugee from A. major, and descendant of the Bagratidæ). His successors extended their dominion over Cilicia and Cappadocia, and took a prominent part in the crusades. This dynasty ruled prosperously until 1374, when A. minor was conquered by the Egyptian sultan Schaban. Since that time, A., with the exception of the parts which Russia has won in the present century from Persia, and which are better governed, has remained subject to the despotism of the Turks and Persians. Notwithstanding this, the Armenians have steadily preserved their nationality, both in its physical and moral lineaments; their faith; and even—though only a relic of their ancient culture—a higher civilization than their conquerors. The political storms which devastated the country during the middle ages, and the persecutions of the Turks, have driven many of the inhabitants from their homes. This is the reason why we find them scattered over all Asia and Europe. In Hungary, Transylvania, and Galicia they number 10,000. They are very numerous in Russia, but most of all in Asia Minor, and in the neighborhood of Constantinople, where they number 200,000.

The greater part of A. is an elevated table-land. Its area is estimated at 90,000 sq.m.;

pop. about 2,000,000. It is watered by the rivers Kur, Aras, Joruk, Euphrates, and to a slight extent by the Tigris. The lakes which lie within this mountainous region are Van, Urumiyah, and Sevan. The Armenian plateau, on the eastern side of which the volcanic range of Ararat lifts itself, forms the central point of several mountain-chains, such as Taurus and Antitaurus, the mountains of Kurdistan, and those which run n. to the Black sea. It exhibits numerous traces of having been subject to volcanic agency, and even yet—as was shown by the severe earthquake of the summer of 1840, and by the total destruction of Erzerum in 1859—possesses an internal volcanic activity. The climate in the higher regions is hot in summer and cold in winter, but in the valleys it is more temperate. The country labors under a great scarcity of wood, and in some parts is sterile, through a deficiency of water; in other parts the soil is extremely fertile. The number of the inhabitants of pure Armenian origin is reckoned at nearly 1,000,000, but there is a large admixture of Turcomans, Greeks, Jews, Kurds, etc. The Armenians belong physically to the finest variety of the Indo-Germanic race. Their intellectual capacity is also remarkable, as is shown both by their literature, and their singular dexterity in business. Still, long centuries of oppression have exerted a withering influence on their native strength of character. The n.e. portion of A., about one third of the whole, was wrested from Persia in 1828, and is under the Russian scepter. About a sixth part to the s.e. still belongs to Persia. The western portion, comprising two thirds of the Armenian area, is Turkish. After the war of 1877-78 between Russia and Turkey, the Berlin conference sanctioned the cession to Russia of a strip of A., including Kars and Ardahan; and the sultan engaged to carry out in A. much-needed reforms, guarantee the Armenians security against the Circassians and Kurds, and undertook to report to the European powers the measures adopted; but he never kept his word, and in fact permitted the Armenians to be oppressed in the most frightful fashion. In 1895, the Turkish outrages in Armenia became so terrible as to lead the signatories of the Treaty of Berlin to assemble a great fleet off the Dardanelles and to demand reforms of the sultan; but the mutual jealousies of powers prevented any decisive action. See ABDUL-HAMID II. and TURKEY.

ARMENIAN CHURCH. Christianity appears to have been introduced into Armenia as early as the 2d century. It was for the first time firmly established, however, about the end of the 3d c. by the apostolical exertions of Bishop Gregory (q.v.), who converted Tiridates (see ARMENIA). The Bible was translated into the Armenian language in the 5th century. After this period great animation prevailed in the A. C. Numbers flocked to the colleges at Athens and Constantinople. In the ecclesiastical controversy concerning the twofold nature of Christ, the Armenian Christians held with the Monophysites (q.v.); refused to acknowledge the authority of the council of Chalcedon; and constituted themselves a separate church, which took the title of Gregorian from Gregory himself. For several centuries a spirit of scientific inquiry, especially in theology, manifested itself among them to a far wider extent than in the other eastern churches. Their greatest divine is Nerses of Klah, belonging to the 12th c., whose works have been repeatedly published. The most recent edition was issued in Venice, 1833. The Gregorians have continued to entertain a deeply rooted aversion to the so-called orthodox church. The Roman Catholic popes at various times, especially (1145, 1341, 1440) when the Armenians accepted the help of the west against the Mohammedans, tried to persuade them to recognize the papal supremacy; but for the most part only the nobles consented to do so, while the mass of the people clung to their peculiar opinions, as we see from the complaint of pope Benedict XII., who accuses the A. C. of 117 errors of doctrine. There is a sect of *United Armenians* in Italy, Poland, Galicia, Persia, Russia, and Marseilles. Since the formation of this body in 1835, vigorous and constant attempts, succored especially by French influence, have been made to secure the acknowledgment of the pope as the head of the Roman Catholic portion of the A. C. When this end seemed nearer attainment than ever before, the Ultramontane utterances of their representatives, Mgr. Hassun, at the ecumenical council at Rome, 1870, in favor of infallibility, created such a reaction at home as has greatly strengthened for the present the cause of the old Gregorian party. The recent humiliation of France has further weakened the cause of the pro-papal party. In theology the A. C. attributes only *one* nature to Christ, and holds that the Spirit proceeds from the Father alone; the latter doctrine, however, being held by it in common with the "orthodox Greek church," although contrary to the theology of the western churches. With respect to the "seven sacraments," it entertains the peculiar notion that at baptism one must be sprinkled three times and as often dipped; that confirmation is to be conjoined with baptism; that the Lord's supper must be celebrated with pure wine and leavened bread; that the latter, before being handed round, must be dipped in the former; and that extreme unction is to be administered to ecclesiastics alone, and that immediately after (and not before) their death. It believes in the worship of saints, but not in purgatory. It exceeds the Greek church in the number of its fasts, but has fewer religious festivals. These, however, are more enthusiastically kept. Divine service is held in Turkey chiefly by night. Mass is celebrated in the old Armenian language; preaching is carried on in the new. Its sacerdotal constitution differs little from the Greek. The head of the church, whose title is *catholikos*, resides at Etshmiadzin, a monastery near Erivan, the capital of Russian Armenia. To this place every Armenian must make a pilgrimage once in his life. The monks of this church follow the rule of St. Basil. The Wartabeds form a peculiar

class of ecclesiastics; they live like monks, but are devoted exclusively to learning. Secular priests must marry once, but none are at liberty to take a second wife. See *illus., PRIESTS, MONKS AND NUNS*, vol. XII.

ARMENIAN LITERATURE. Previous to the introduction of Christianity by Gregory (300 A.D.), the Armenians had adhered to the Assyrian or Medo-Persian system of culture; but excepting a few old songs or ballads, no remains of that early period exist. After their conversion to Christianity, the Greek language and its literature soon became favorite objects of study, and many Greek authors were translated into Armenian. (See Wenrich *De Auctororum Græcorum versionibus Arabicis, Armeniacis*, etc. Leipzig, 1842.) The Armenian language has an alphabet of its own, consisting of 36 letters, introduced by Miesrob in 406. The most flourishing period of A. L. extends from the 4th to the 14th century. The numerous Armenian theological writers and chroniclers of this era supply materials for a history of the east during the middle ages which have hitherto been too much neglected. These Armenian writers generally copied the style of the later Greek and Byzantine authors; but in adherence to facts and good taste, they are superior to the general order of oriental historians. In the 14th c., literature began to decline, and few remarkable works were afterwards produced; but since the time of their dispersion, the Armenians have preserved recollections of their national literature; and wherever they are found—in Amsterdam, Lemberg, Leghorn, Venice, Astrakan, Moscow, Constantinople, Smyrna, Ispahan, Madras, or Calcutta—the printing-office is always a feature in their colonies. The most interesting Armenian settlement is that of the Mechitarists (q.v.), on the island of San Lazaro, near Venice.

The Bible translated into Armenian (the Old Testament from the text of the Septuagint) by Miesrob and his scholars (411 A.D.), is esteemed the highest model of classic style. Translations of several Greek authors, made about the same time, have been partly preserved, and contain some writings of which the originals have been lost—namely, the Chronicle of Eusebius; the Discourses of Philo; homilies by St. Chrysostom, Severianus, Basil the great, and Ephraim Syrus. Several old geographical and historical works have been preserved. Among philosophical and theological writers may be mentioned: David, the translator and commentator of Aristotle, Esnik, and Joannes Ozniensis. The *Vitæ Sanctorum Calendarii Armeniaci* (Lives of Armenian Saints, 12 vols. Ven. 1814) contains many notices of the history of Armenia. In poetry and fiction, A. L. is poor. Somal, in his work entitled *Quadro della Storia Letteraria di Armenia* (Venice, 1829), gives a general view of the contents of A. L. The Armenian belongs to the Indo-Germanic group of languages, but has many peculiarities of structure. It is harsh and disagreeable to the ear. The old Armenian, the language of literature, is no longer a living tongue; while the new Armenian, split up into four dialects, contains many Turkish words and grammatical constructions.

ARMENTIERES. a t. of the dep. of Nord, France, on the Lys, 8 m. from Lille. The t. is well built, and is active and prosperous, having manufactures of cotton, linen, and hemp, and a considerable trade in grain. Pop. 26,200.

ARMERIA. See THRIFT.

ARM FELT, GUSTAF MAURITZ, a celebrated Swede, whose public life was characterized by striking vicissitudes of fortune, was the eldest son of Baron Armfelt, and b. at Juva, in the government of Abo, on the 1st of April, 1757. Having, as an officer of the royal guard, displayed great activity and zeal in opposing the machinations of the nobles, who were at that period disaffected towards Gustavus III., the latter appreciated the value of his services, and appointed him to a post in the service of the crown prince. During the war between Sweden and Russia (1788-90), in which he was commander of one of the three divisions of the Swedish army, he displayed remarkable courage and spirit, and advanced still higher in the good graces of the monarch. He defeated a Russian force at Summa, near Fredrikshamn; and as military representative of Gustavus, had the honor of concluding a peace at Verela on the 14th of Aug., 1790. On the 16th of Mar., 1792, Gustavus was assassinated. His wound, though mortal, did not instantly deprive him of life, and he employed the brief interval that elapsed before his death in drawing up a codicil to his will, by which the regency was intrusted to the king's brother, Charles, duke of Sudermania, during the minority of Gustavus IV., A. being named governor of Stockholm, and member of the council appointed to advise with the regent. The duke of Sudermania, however, could not brook the idea of a check being placed upon his liberty of action, and found means to destroy the codicil, the conditions of which he never intended to observe. A. soon became conscious that his influence was rapidly evaporating. He was rarely permitted to see the young king; and at last, after a secret interview with young Gustavus, departed as ambassador to Naples in July, 1792. While in Italy, he entered into correspondence with certain parties in Sweden for the purpose of overthrowing the regency, and inducing the states to proclaim Gustavus IV. of age. The correspondence was discovered. A. fled to Poland, and afterwards to Russia. He was condemned, during his absence, for high treason, and stripped of his goods and titles, while one of his associates, the beautiful Countess Rudensköld, was subjected to the most brutal punishment, being publicly declared "infamous," exposed on a scaffold for some hours, and imprisoned in a house of correction for life. A. expressed his horror of such an atrocity in language sufficiently emphatic, yet, at a later period, he did

not scruple to accept office under Charles, on his election to the throne. In 1799, Gustavus IV. received the crown at the age of eighteen, and A. was restored to all his honors. In 1805, he was appointed governor-general of Finland; and in 1808 he commanded the Swedish army raised for the invasion of Norway; but his plans were so completely frustrated, that he was compelled to witness the invasion of Sweden by the successful Norwegians, and was in consequence recalled and dismissed by the king. In the following year a revolution took place, Gustavus was deposed, the duke of Sudermania elected in his place, and A. was appointed president of the military council. But shortly after, being implicated in the poisoning of the prince of Augustenburg, he was obliged to fly to Russia, where he lived during the remainder of his life in high honor. The title of count was conferred on him, he was made chancellor of the university of Abo, president of the board of Finnish affairs, and member of the Russian senate. He d. at Tzarskœ Selo on the 19th Aug., 1814.

ARMIDA, one of the most prominent female characters in Tasso's *Jerusalem Delivered*. As the poet tells us, when the crusaders arrived at the holy city, Satan held a council to devise some means of disturbing the plans of the Christian warriors, and A., a very beautiful sorceress, was employed to seduce Rinaldo and other crusaders. Rinaldo was conducted by A. to a remote island, where, in her splendid palace, surrounded by delightful gardens and pleasure-grounds, he utterly forgot his vows, and the great object to which he had devoted his life. To liberate him from his voluptuous bondage, two messengers from the Christian army—Carlo and Ubaldo—came to the island, bringing a talisman so powerful that the witchery of A. was destroyed. Rinaldo escaped, but was followed by the sorceress, who, in battle, incited several warriors to attack the hero, and at last herself rushed into the fight. She was defeated by Rinaldo, who then confessed his love to her, persuaded her to become a Christian, and vowed to be her faithful knight. The story of A. has been made the subject of an opera both by Gluck and Rossini.

ARMIES, armed forces under regular military organization, employed for purposes of national offense or defense. An army may comprise the whole military men employed by the state, or only a portion under a particular commander. When an armed force is under no constituted authority, and imperfect in its organization and discipline, it cannot be said to be worthy of the name of an army, and may be little better than a horde of banditti. Of this nature are the *filibustering* expeditions (see **FILIBUSTERS**) in which certain portions of the citizens of the United States at one time engaged. Through long ages of experience, the principles of military organization, and the laws to which A. are specially amenable, have gradually reached a high degree of perfection. The primitive wars among barbarous people are always stealthy, depending on the forest and the wilderness for their tactics, and considered successful if an enemy can be attacked unawares, despoiled, and carried into slavery. After a time, war advances to the position of an art, and is conducted by men who have received a certain training. An army becomes an instrument not only for vanquishing enemies, but for seizing countries. Even then the highest position of an army is not reached; for the defense of a country requires more military skill, perhaps, and a better organization of troops, than an attack.

In the several historical articles in this cyclopædia relating to the chief nations of ancient and modern times, the wars in which these nations engaged are succinctly noticed as elements in the life of each nation; but it seems desirable, in the present place, as a means of rendering intelligible certain minor details scattered through the work, to give a brief description of the chief points in which the A. of different states or countries have differed in constitution.

ARMIES, ANCIENT—Egyptians.—The most extraordinary conqueror among the Egyptians, Sesostris, or Rhamses, lived 16 centuries before the Christian era; and although the evidence for his deeds of valor is very questionable, there is reason to believe that the organization of his A. can be pretty accurately traced. His father, Amenophis, laid the foundation for the military glory of Sesostris. When the latter was born, Amenophis caused all the male children who were born on the same day as his son to be set apart as a special body, to be reared for a military life; they were taught everything that could strengthen their bodies, increase their courage, and develop their skill as combatants and leaders; and were to consider themselves bound as the chosen dependents or companions of the young prince. In due time Sesostris became king of Egypt; and then he formed a sort of militia, distributed as military colonists, each soldier having a portion of land to maintain himself and his family. When this militia had been drilled to military efficiency, Sesostris headed them as an army for military conquest in Asia, and placed the chosen band above mentioned as officers over the different sections of the army.

Persians.—In the great days of the Persian empire, the flower of the army consisted of cavalry who were distinguished for their bravery and impetuosity of attack. The infantry were little better than an armed mob. The war-chariots, too, though calculated to strike terror when dashing into hostile ranks, were available only on level ground. As to the numbers of men composing the great Persian A., the statements are too wild to be trustworthy. Allowing for all exaggeration, however, it is certain that the Persian

A. were very large. When Darius was opposed to Alexander the Great, his army was set down at various numbers—from 750,000 to 1,000,000 men. The king was in the center, surrounded by his courtiers and body-guard; the Persians and Susians were on the left; the Syrians and Assyrians on the right. The foot-soldiers, forming the bulk of the army, and armed with pikes, axes, and maces, were formed in deep squares or masses; the horsemen were in the intervals between the squares, and on the right and left flanks; and the chariots and elephants in front.

Lacedæmonians.—The Greeks introduced many important changes in A., both in the organization and in the maneuvers. Every man, in the earlier ages of the country at least, was more or less a soldier, inured to a hard life, taught to bear arms, and expected to fight when called upon. The leading men in each state paid attention to organization and tactics in a way never before seen. It was not standing A., but a sort of national militia, that gained Marathon, Platea, and Mycale. So far as concerned the arrangement of A., the Lacedæmonians invented the *phalanx* (q.v.), a particular mode of grouping foot-soldiers. This phalanx consisted of eight ranks, one behind another; the front and rear ranks being composed of picked men, and the intermediate ranks of less tried soldiers. The number of men in each rank depended on the available resources of the commander. These men were mostly armed with spears, short swords, and shields.

Athenians.—The Athenians made a greater number of distinctions than the Lacedæmonians in the different kinds of troops forming their A. They had heavy infantry, constituting the men for the phalanx, and armed with spears, daggers, corselets, and shields; light infantry, employed in skirmishes and in covering the phalanx, and armed with light javelins and shields; a sort of irregular infantry, who, with javelins, bows and arrows, and slings, harassed the enemy in march, and performed other services analogous in some degree to those of sharpshooters in a modern army. It is recorded that Miltiades, the Athenian hero at Marathon, invented the "double-quick march," to increase the momentum of a phalanx when rushing on the enemy.

Macedonians.—Philip of Macedon, the father of Alexander the Great, having the sagacity to see that he could not vanquish his neighbors so long as he adopted the same formation and tactics as themselves, set about inventing something new. He resolved to have a standing army instead of a militia; to have at command a set of men whose trade was fighting, instead of citizens who were traders and soldiers by turn. As a further change, he made the phalanx deeper and more massive than it had been among the Lacedæmonians. He brought into use the Macedonian pike, a formidable weapon 24 ft. in length. With a phalanx sixteen ranks in depth, four rows of men could present the points of their long pikes protruding in front of the front-rank, forming a bristling array of steel terrible to encounter. Besides these heavy infantry, there were light troops marshaled into smaller bodies for more active maneuvers. Philip organized three kinds of cavalry—heavy, armed with pikes, and defended by cuirasses of iron-mail; light, armed with lances; and irregular.

Thebans.—This nation introduced the army-formation of *columns*, much deeper than broad, or having more men in file than in rank. A new kind of tactics was introduced in accordance with this formation; the movement being intended to pierce the enemy's line at some one point, and throw them into confusion.

Romans.—These able warriors initiated changes in army matters, which had a widespread influence on the nations of the civilized world. About the period 200 B.C., every Roman, from the age of 17 to 46, was liable to be called upon to serve as a soldier; the younger men were preferred; but all were available up to the middle-time of life. They went through a very severe drilling and discipline, to fit them alike for marching, fighting, camping, working, carrying, and other active duties. Every year the senate decreed the formation of *legions*, or army corps, deputing this duty to the consul or prætor. Magistrates sent up the names of eligible men, and tribunes selected a certain number from this list. See *LEGION*. The Roman legion, in its best days, had many excellent military qualities—great facility of movement; a power of preserving order of battle unimpaired; a quick rallying-power when forced to give way; a readiness to adapt itself to varying circumstances on the field of battle; a formidable impetuosity in attack; and a power of fighting the enemy even while retreating. The heavy infantry were armed with javelins, heavy darts, pikes, and swords; the lighter troops with bows and arrows, slings, and light javelins; while the defensive armor comprised shields, cuirasses, helmets, and greaves.

Those ancient nations which had no distinctive features in their A. need not be noticed here.

ARMIES, MEDIEVAL. The downfall of the Roman empire marked the dividing-point between ancient and mediæval times in military matters, as well as in other things that concern the existence of nations. The barbarians and semi-barbarians who attacked on all sides the once mighty but now degenerate empire, gradually gained possession of the vast regions which had composed it. The mode in which these conquests were made gave rise to the *feudal system* (q.v.). What all had aided to acquire by conquest, all demanded to share in proportions more or less equal. Hence arose a division of the conquered territory; lands were held from the chief by feudal tenure, almost in independent sovereignty. When European kingdoms were gradually formed out of the wrecks of

the empire, the military arrangements put on a peculiar form. The king could not maintain a standing army, for his barons or feudal chieftains were jealous of allowing him too much power. He could only strengthen himself by obtaining their aid on certain terms, or by allowing them to weaken themselves in intestine broils, to which they had always much proneness. Each baron had a small army composed of his own militia or retainers, available for battle at short notice. The contests of these small armies, sometimes combined and sometimes isolated, make up the greater part of the wars of the middle ages. Of military tactics or strategy, there was very little; the campaigns were desultory and indecisive; and the battles were gained more by individual valor than by any well-concerted plan.

One great exception to this military feudality was furnished by the *crusades* (q.v.). So far as concerns A., however, in their organization and discipline, these expeditions effected but little. The military forces which went to the Holy Land were little better than armed mobs, upheld by fanaticism, but not at all by science or discipline. Numbers and individual bravery were left to do the work, combination and forethought being disregarded.

A much greater motive-power for change, during the middle ages, was the invention of gunpowder. When men could fight at a greater distance than before, and on a system which brought mechanism to the aid of valor, everything connected with the military art underwent a revolution. Historically, however, this great change was not very apparent until after the period usually denominated the middle ages. The art of making good cannon and hand guns grew up gradually, like other arts; and A. long continued to depend principally on the older weapons—spears, darts, arrows, axes, maces, swords, and daggers.

During the greater part of the 14th and 15th centuries, the chief A. were those maintained by the Spaniards and the Moors on one European battle-ground, by the English and the French on another, and by the several Italian republics on a third. In those A., the cavalry were regarded as the chief arm. The knights and their horses alike were frequently covered with plate or chain armor; and the offensive weapons were lances, swords, daggers, and battle-axes. A kind of light cavalry was sometimes formed of archers on smaller horses. As to army formation, there was still little that could deserve the name; there was no particular order of battle; each knight sought how he could best distinguish himself by personal valor; and to each was usually attached an esquire, abetting him as a second during the contest. Sometimes it even happened that the fate of a battle was allowed to depend on a combat between two knights. No attempt was made, until towards the close of the 15th c., to embody a system of tactics and maneuvers for cavalry; and even that attempt was of the most primitive kind. Nor was it far otherwise with the foot-soldiers; they were gradually becoming acquainted with the use of firearms; but, midway as it were between two systems, they observed neither completely; and the A. in which they served presented very little definite organization.

ARMIES, MODERN. **AFGHANISTAN.**—No reliable statistics can be procured for the exact strength of the Afghan army. In 1896 it was estimated at 50,000. In 1890, 20,000 were stationed in and about Kabul, including six mule batteries of artillery, two field batteries, an elephant battery, 40 squadrons of cavalry, and 8,000 infantry. At Kabul there is an arsenal at which cannon and small arms are manufactured under the superintendence of English officers.

ARGENTINE REPUBLIC.—In 1894 the army comprised 37 generals, 685 infantry officers, 507 cavalry, 167 artillery and 2 engineers; the privates numbered 6,498, but in 1896 the total effective was placed at 15,302.

AUSTRIA-HUNGARY.—The following table shows the strength of the Austro-Hungarian army on a peace footing in 1895:—

	Officers.	Men.	Total.
Army—			
Staff	2,606	4,301	6,907
Sanitary Troops	81	6,838	6,919
Establishments	2,332	7,512	9,844
Infantry	9,153	181,937	191,090
Cavalry	1,982	46,864	48,846
Artillery—			
Field	1,323	26,011	27,334
Fortress	420	7,746	8,166
Pioneers, etc.	584	10,049	10,633
Train	388	3,486	3,874
Austrian Landwehr—			
Infantry	1,770	16,773	18,543
Cavalry	236	1,882	2,118
Hungarian Landwehr—			
Infantry	2,340	14,094	16,434
Cavalry	230	3,314	3,544
Total.....	23,445	330,807	354,252

In case of war the number of men who would be obliged to serve in the Landsturm is over 4,000,000, while the actual strength of the army on a war footing is placed at 45,238 officers and 1,826,940 men.

BELGIUM.—The following table shows the strength of the Belgian army on a peace footing in 1895:—

	Officers.	Rank and File.	Total.
Infantry.....	1,927	27,885	29,812
Cavalry.....	376	5,820	6,196
Artillery.....	469	8,501	8,970
Engineers.....	95	1,637	1,732
Gendarmerie.....	60	2,462	2,522
Others.....	578	2,343	2,921
Total.....	3,505	48,648	52,153

For this army there are 7,200 horses and 200 guns, and for the gendarmerie 1,636 horses. In time of war the total strength is 163,082 men, 3,505 officers, 14,000 horses and 240 guns. Besides the standing army there is a "Garde Civique" numbering 42,732 men, organized as far as possible in the communes, and having as part of their duties the maintenance of the integrity and independence of the territory; but the field of its activity is confined to communes having over 10,000 inhabitants and to fortified places.

BRAZIL.—Obligatory service was introduced in 1875, but exemption from military service may be obtained by either personal substitution or on payment of a small sum to the government. The duration of service is six years in the active army and three years in the reserve. Efforts have been made for reorganizing the service, but the work is not yet complete. The peace effective of the army is reported as 4,000 officers and 25,000 men for 1895. The gendarmerie numbered 20,000 men. The infantry included 40 battalions with one transport company and one depot company. The cavalry comprised 16 regiments and the artillery 5 regiments of horse and 9 regiments of foot; there were also two pioneer battalions of engineers. In case of war this force can be doubled.

BRITISH EMPIRE.—The regular army of the United Kingdom, exclusive of India, consisted in 1895 of 7,501 commissioned officers, 1,044 warrant officers, 15,020 sergeants, 3,682 drummers, trumpeters, etc., and 127,156 rank and file, a total of 155,403 of all ranks. This is composed of the following staff, regiments and miscellaneous establishments:—

BRANCHES OF THE MILITARY SERVICE.	Officers.	Non-Commissioned Officers, Drummers, etc.	Rank and File.
GENERAL AND DEPARTMENT STAFF.			
General Staff.....	332	124	5
Army Accountants.....	209	..	..
Chaplains' Department.....	88	..	..
Medical Department.....	619	1	..
Veterinary Department.....	68	6	1
Total Staff.....	1,316	131	6
REGIMENTS.			
Cavalry, including Life and Horse Guards.....	553	1,371	11,396
Royal Artillery.....	856	2,095	20,393
Royal Engineers.....	592	1,235	5,621
Infantry, including Foot Guard.....	2,804	6,642	79,208
Colonial Corps.....	158	373	4,696
Department Corps.....	139	1,291	2,937
Army Service Corps.....	245	914	2,730
Total Regiments.....	5,347	13,921	126,981
Staff of Yeomanry, Militia, and Volunteers.....	599	6,194	10
Miscellaneous Establishments, total.....	239	500	159
Total Regular Army.....	7,501	20,746	127,156

The European army in India consisted in 1895 of 77,492 officers and men; besides the regular army there are four classes of reserve, namely, the Militia, the Yeomanry Cavalry, the Volunteer corps and the Army Reserve force. With these the total available military force in 1895-96 was 718,821.

BULGARIA AND EASTERN ROUMELIA.—The army, which was reorganized in 1895, contains on a peace footing about 39,320 officers and men, and on a war footing about 175,000.

CHILE.—The strength of the army is not by law allowed to exceed 9,000 men, distributed among 5 regiments of artillery, 9 of infantry, 8 of cavalry, and a corps of engineers. There are four generals of division, 6 of brigade, 18 colonels, 40 lieutenant-colonels,

and 555 inferior officers. Besides the regular army there is a National Guard composed of citizens, which in 1894 numbered 51,090 men. Steps have been taken to reorganize this guard, requiring every citizen between the ages of 20 and 40 to serve.

CHINA.—No reliable statistics are procurable to show the extent of the Chinese military force. The following statistics are taken from the *Statesman's Year Book* for 1896:—The Eight Banners, including Manchus, Mongols, and the Chinese, numbered 323,800. Of these 100,000 are supposed to be reviewed by the Emperor at Peking once a year. The Ying Ping, or National Army, numbers 6,459 officers and 650,000 privates.

The war with Japan disclosed a wretched condition in the discipline and equipment of the army. The best fighting force in that war was the Black Flag Troops, who were said to number 50,000 men. After these were the Eight Banner men and the Army of Manchuria; the latter were estimated at 180,000. The Army of Turkestan is employed in keeping order in the western provinces, and the number of men varies considerably.

COLOMBIA.—The strength of the national army is determined by Act of Congress each year. The peace footing is 5,500. In case of war the Executive can raise the army to the strength which circumstances may require.

COSTA RICA.—Costa Rica has an army of 600 men and 12,000 militia, but on a war footing can command 34,000 militia, as every male between 18 and 50 is bound to serve.

DENMARK.—The army consists of all the able-bodied men of the kingdom who have reached the age of 22 years. They are liable to service for eight years in the regular army and its reserve, constituting the first line, and for eight years subsequent in the extra reserve. The forces of the kingdom comprise 31 battalions of infantry of the line, with 11 of reserve; 5 regiments of cavalry made up of 16 squadrons; 2 regiments of field artillery of 12 batteries, and 4 of reserve; 3 battalions of garrison artillery of six companies each, and 1 regiment of engineers. The total peace strength in 1895 was 751 officers and 10,000 men; war strength 1,352 officers and 45,910 men; with the Citizen Corps the total war strength is about 60,000 men,—this is exclusive of the extra reserve, only called out in emergencies, and numbering 16,500 officers and men.

ECUADOR.—The standing army is 3,341 officers and men divided into one brigade of fortress and one brigade of field artillery, 4 battalions of infantry, 2 columns of light infantry, and a regiment of cavalry.

EGYPT.—All Egyptian subjects are liable to military service,—6 years in the army, 5 in the police, and 4 in the reserve. In the regular force there are 13 infantry battalions, of which 8 are Egyptian and 5 Soudanese; artillery, 7 batteries; cavalry, 1 regiment. The total effective strength is about 17,000 men.

FRANCE.—According to the *Statesman's Year Book* for 1896 the peace strength of the French army was 598,263. The following table shows the subdivisions of the army and their relative strength:—

	FRANCE.	ALGERIA.	TUNIS.	TOTAL.
	Men. (Officers.)	Men. (Officers.)	Men. (Officers.)	Men. (Officers.)
General Staff	4,113 (3,405)	368 (276)	86 (65)	4,567 (3,746)
Military Schools	3,255 (380)	.... (....)	.... (....)	3,255 (380)
Unclassed amidst the Troops	1,945 (1,639)	798 (564)	113 (110)	2,856 (2,373)
ARMY CORPS.				
Infantry	315,988 (11,845)	36,629 (855)	8,744 (256)	361,361 (12,956)
Administrative	11,844 (....)	3,538 (....)	494 (....)	15,876 (....)
Cavalry	67,482 (3,489)	7,866 (359)	1,853 (86)	77,201 (3,934)
Artillery	78,512 (3,880)	2,533 (50)	854 (17)	81,899 (7,323)
Engineers	12,016 (459)	801 (12)	325 (4)	13,142 (475)
Train	8,462 (361)	2,832 (39)	951 (12)	12,245 (412)
Total Army Corps	494,304 (20,034)	54,199 (1,315)	13,221 (375)	561,724 (21,724)
Total Active Army	503,617 (25,518)	55,365 (2,155)	13,420 (550)	572,402 (28,223)
Gendarmerie	21,535 (623)	1,122 (31)	154 (3)	22,811 (657)
Garde Républicaine	3,050 (83)	.... (....)	.... (....)	3,050 (83)
Grand Total	528,202 (26,224)	56,487 (2,186)	13,574 (553)	598,263 (28,963)

Since the war of 1870 there has been a great improvement in the French military service, and in spite of the demand for the reduction of the burdens of military duty this

improvement has continued. In 1897 the Minister of war demanded that the peace footing of the army should be raised to 550,000 and refused to accept the reduction proposed by the Budget Committee. The conditions of service have several times been modified. On July 15, 1889, exemptions were abolished and the period of service was extended to 25 years, an increase of 5 years over the period previously required; but the time to be served with the colors was reduced to three years. The Law of 1892 added 3 years to the time of service in the reserve, reducing by the same amount the time to be spent in the Territorial reserve. Under existing statutes the requirements of service are as follows:—3 years in the Active army, 10 in the reserve of the Active army, 6 years in the Territorial army and 6 in the reserve of the Territorial army.

GERMANY.—The German army in 1897 was composed of 21 army corps, each army corps being considered a unit and independent in itself. In each corps there are two divisions of infantry, a cavalry division of 4 regiments and 2 horse artillery batteries, 2 cavalry regiments attached to the infantry divisions, a reserve of artillery containing 6 field batteries, 1 mounted battery, 1 battalion of pioneers and 1 of train.

It is enacted in the constitution of 1871 that "every German is liable to service — and no substitution is allowed." Every German capable of bearing arms must serve in the standing army for six years; two of these years must be spent in active service and the remaining four years in the reserve army. After this he serves in the Landwehr for twelve years. Service begins at the age of 20, and the number of young men fit for service who reach this age annually averages 360,000. Owing to the limitation of the peace footing of the army, only a certain number, who are chosen by lot, join the army; the remainder are drafted into the Ersatztruppen, a kind of reserve, in which the period of service is twelve years. The Army Act of Oct. 1, 1893, increased the annual levies by about 60,000 men, reducing the period of service of the infantry from three to five years. Young men of superior education are permitted under certain conditions to substitute one year's service at their own expense for the long period of service regularly required. Of these one-year volunteers about 8,000 join annually. Besides the reserve forces above mentioned there is the Landsturm, to be called out only in case of an invasion of German territory.

All able-bodied men from 17 to 45 years, who are not in the standing army or reserve are required to serve in the Landsturm.

The following table, taken from the *Statesman's Year Book* for 1896, shows the peace strength of the army in 1895-96:—

PEACE FOOTING.	Officers.	Rank and File.
Infantry, 173 Regiments	11,774	363,432
Rifles, 19 Battalions	410	12,027
Bezirkskommandos, 290	734	5,413
Surgeons, Instructors, etc. ....	...	2,714
Total Infantry	12,918	383,586
Cavalry, 93 Regiments	2,352	65,499
“ Special Services, including Officers. ....	...	828
Field Artillery, 43 Regiments	2,671	58,424
“ “ Special Services, including Officers. ....	...	809
Foot Artillery, 17 Regiments and 1 Battalion	869	22,857
“ “ Special Services, including Officers. ....	...	132
Pioneers, 23 Battalions, 3 Railway Regiments, 1 Balloon Detachment, 1 Railway Battalion, and 3 Railway Companies	729	19,018
Special Pioneer Services .....	...	124
Train, 21 Battalions	307	7,631
Special Train Services .....	...	69
Special Formations	486	2,896
Non-Regimental Officers, etc.	2,286	243
Total	22,618	562,116

GREECE.—Military service is incumbent upon all males above the age of 21. The standing army comprises 10 infantry regiments, 3 cavalry regiments, and 3 regiments of field artillery. The strength of the army in 1895 was reported as follows:—

BRANCHES OF THE MILITARY SERVICE.	Officers.	Non-Commissioned Officers.	Total.
War Office	204	36	240
Infantry	857	15,182	16,039
Cavalry	93	1,053	1,146
Artillery	222	2,065	2,287
Engineers	101	1,112	1,213
General Services	206	295	501
Military Schools	54	168	222
Gendarmerie	143	3,086	3,229
Total	1,880	22,997	24,877

The strength of the army on a war footing was estimated at 100,000 men. The reserve numbered 104,500 and the so-called territorial army about 146,000 men. The organization, however, is very deficient.

GUATEMALA. — The army of Guatemala, the cost of which is about one-tenth of the total public expenditure, consisted in 1894 of 7000 officers and men. The active army had 50,718, and the reserve 34,000 men.

HAITI. — After the reorganization Act of 1878 the army consisted nominally of 6,828 men, chiefly infantry. Besides this there is a special "Guard of the Government," numbering 650 men, commanded by 10 generals, who also act as aides-de-camp to the President of the Republic.

ITALY. — Universal liability to military service forms the basis of the organization of the Italian army. A certain portion of all the young men who have completed their twentieth year is levied annually, and, as in the German army, young men of superior education are allowed to serve as one-year volunteers on certain conditions, that is, on payment of a certain sum. The army is divided into three classes, namely, the Permanent Army, the Mobile Militia and the Territorial Militia. It consists of twelve army corps, each corps containing two divisions and each division from two to five military districts.

The following is the strength of the army according to the official statements in 1896:—

	PERMANENT ARMY.		MILITIA.	
	Under Arms.	On Unlimited Leave.	Mobile and Sardinia Island.	Territorial.
OFFICERS.				
Effective.....	14,431	....	76	5,636
Half-Pay	200	....	....	....
Supplementary .....	....	6,036	4,309	....
Auxiliary .....	....	....	1,075	....
Reserve .....	....	....	....	6,579
Total Officers.....	14,631	6,036	5,460	12,215
TROOPS.				
Carabineers.....	23,639	5,094	1,229	15,188
Infantry.....	97,026	260,094	299,637	493,291
Bersaglieri.....	12,646	31,887	34,842	41,990
Alpine Troops	9,058	27,235	31,429	31,827
Military Districts	8,940	122,734	....	....
Unassigned .....	....	....	25,018	1,371,682
Cavalry	23,289	19,707	....	49,399
Artillery	30,016	92,208	58,699	53,682
Engineers	7,376	23,885	15,330	11,947
Military Schools	1,334	....	....	....
Sanitary Corps	2,375	9,238	9,120	14,024
Commissariat	1,865	4,961	2,904	3,096
Invalid and Veteran Corps	181	....	....	....
Penal Establishments and Disciplinary Companies	2,307	....	....	....
Guards (Policemen, etc.) .....	....	....	4,395	10,179
Depot for Horses	408	....	....	....
Central Depot, African Troops .....	....	....	....	....
Railway and Telegraph Service .....	....	....	....	21,529
Total Troops.....	220,460	597,043	482,603	2,117,834
Grand Total	235,091	603,079	488,063	2,130,049
3,456,282				

There is also a special African corps containing 211 officers and 5,888 men (4,393 natives) in 1895.

JAPAN.—All males 20 years old are liable to serve in the standing army for seven years, of which three must be spent in active service and the remainder in the reserve. After leaving the army they form part of the *landwehr* for another five years, and every male from 17 to 40 years of age not in any of the above classes must belong to the *landsturm*. The standing army is composed of an Imperial Guard and six divisions. The Imperial Guard in 1893 had 325 officers and 7,312 men. The six divisions numbered 2,531 officers, 48,140 men. With the Jesso Militia the peace effective in 1893 was 3,615 officers and 65,098 men. The reserve was 94,676 and the *landwehr* 106,053. After the war with China, plans for a reorganization of the army were set on foot, and it was expected that by 1901 77,000 men would be added to the service.

MEXICO.—The army in 1895 consisted of 23,730 infantry, 11,069 cavalry, 2,304 artillery and train; total, 37,103. The fighting strength of the army was estimated at 132,000 infantry, 25,000 dragoons, and 8,000 artillery. Every Mexican capable of bearing arms is liable to military service between the ages of twenty and fifty.

MOROCCO.—The Sultan's army, which is quartered at the capital, is composed of 10,000 Askar or disciplined infantry and 400 cavalry. Besides these there are a few batteries of field guns and 2,000 irregular cavalry.

THE NETHERLANDS.—The regular army on a war footing consisted in 1895 of 46,039 infantry, 3,132 cavalry, 1,632 engineers, 16,080 artillery; total about 68,000 men (not

officers), including special services. The peace effective amounted only to 20,222 men and 1,766 officers.

NORWAY.—The Norwegian army consists of three divisions: the Line, the Landværn, and the Landstorm. In 1894 the army numbered 30,000 men with 900 officers.

PERSIA.—No figures of recent date can be given for the Persian army; but according to the latest official returns it numbered 105,500 men, including 5,000 artillery, 54,700 infantry, 25,200 cavalry, and 7,200 militia. The standing army, however, numbered but 24,500. By order of the Shah these forces are raised by conscription.

PERU.—Infantry, 1,500; cavalry, 500; artillery, 500; gendarmerie, between 2000 and 3000.

PORTUGAL.—There is universal liability to service for young men of 21 years of age, with certain exceptions. In 1893 the strength of the army on a peace footing was 34,172 of all ranks; on a war footing the total number was 150,000 men, and 4,000 officers. Besides these forces there is a Colonial army numbering about 9,000 men.

ROUMANIA.—The permanent army in times of peace is 3,000 officers, and 48,500 men. The territorial army numbered, according to the latest official statistics, 81,843 men. The army consists of four army corps, an independent division at Dobrogea and an independent cavalry division.

RUSSIA.—Since 1874 military service has been rendered obligatory for all men from their 21st year. Out of about 870,000 men reaching their 21st year annually, about 275,000 are taken into the active army, the remainder going into the 1st or 2nd reserves. The Russian army on a war footing, according to the figures for 1894, was 2,532,496 of all ranks.

The army may be divided into three classes, the European Army, the Army in Asiatic Dominions, and the Army of Finland. The figures for the European Army in the year 1892 on a peace footing are as follows:—

EUROPEAN ARMY.	Officers.	Men. (Combatants and Non-Combatants.)
General Staff and Chief Command.....	1,920	....
8314 Infantry Battalions (52 Riflemen).....	16,081	403,708
121 Reserve Battalions		
26 Fortress Infantry Battalions }	4,865	87,945
506 Cavalry Squadrons (210 Cossack Hundreds).....	4,022	100,605
65 Squadrons of Second Reserve "Cadres".....	351	8,422
367 Field Batteries.....	2,296	68,021
37 Reserve and 2 Second Reserve (zapas) Batteries.....	429	7,668
200 Fortress Artillery Companies.....	650	23,500
122 Engineers' Companies.....	705	16,197
11 Fortress Sappers		
10 Torpedo Companies }	115	2,823
20 Telegraph, 6 Engineers', and 3 Balloon Parks.....	107	1,290
20 Train "Cadre" Companies.....	75	1,995
5 Gendarmes' Squadrons.....	18	270
116 Detachments of Frontier Guards, etc.....	860	28,500
Total European Army.....	30,574	750,944

SERVIA.—On a peace footing in 1893 the standing army numbered 580 officers and 12,112 men; on a war footing there would have been 105,575 troops in the 5 territorial divisions, 15,065 independent troops, and 27,302 depot and Ersatztruppen; total of the regular army, 148,022. Both bands of the popular levy amounted to 337,323.

SIAM.—There is a small standing army, and every male inhabitant from the age of 21 is obliged to serve for 3 years as a recruit and afterwards 3 months in each year; there are, however, many exemptions. The army is estimated at from 10,000 to 12,000 men available, but only 5000 are under arms. A good many officers are Europeans.

SPAIN.—Under the military law of 1885 the Spanish army consists of a permanent army, first, or active reserve; second, or sedentary reserve. All Spaniards over 20 years of age are liable to be drawn for the permanent army, but can procure exemption by the payment of 1500 pesetas. The following is the strength of the regular army:—

	PERMANENT.		WAR.
	Officers.	Men.	Men.
Generals.....	240	....	....
Staff.....	232	....	....
Infantry.....	6,088	45,679	124,063
Cavalry.....	1,360	13,139	17,156
Artillery.....	963	8,386	12,166
Engineers.....	425	3,399	11,027
Administration.....	....	....	11,140
Sanitary, etc.....	7	226	483
Total.....	9,315	70,829	176,035

SWEDEN.—The army is composed of the following classes of troops: the Värfvade, or enlisted troops; the Indelta, paid and kept by the Landowners; the Värnplgtige or

conscription troops. The strength of the permanent army on a peace footing, exclusive of the last class, according to the reorganization of 1892, was as follows:—

PERMANENT ARMY.	Officers.	Non-Com-missioned Officers.	Musicians.	Men (exclu-sive of Musicians).	Civil and Civil Military Persons.	Total.	Field Guns.
Generals.....	9	....	....	....	....	9	....
General Staff and Staff-College.....	39	2	....	....	185	226	....
Infantry.....	1,232	1,132	1,280	23,612	199	27,455	....
Cavalry.....	232	210	152	4,615	60	5,269	....
Artillery.....	298	255	167	3,272	141	4,133	240
Engineers.....	77	53	21	821	13	990	....
Train.....	66	124	24	522	36	772	....
Total.....	1,953	1,781	1,644	32,842	634	38,854	240
Reserve 1894.....	589	421	....	....	36	1,046	....

SWITZERLAND.—Every citizen of the Republic of military age, not exempt on account of bodily defect or other reason, is liable to military service. There are three classes of troops: The Elite, consisting of men able to bear arms, from 20 to 32; the Landwehr, comprising all men between 33 and 44; and the Landsturm, which can only be called out in time of war, consisting of all citizens not otherwise serving, between 17 and 50.

In 1895 the strength of the Swiss army was as follows:—

	Elite.	Landwehr.	Landsturm.
Staff of Army.....	12	....	....
Staffs of Div. and Ry. Sections.....	66	50	....
Infantry.....	100,353	57,507	58,014
Cavalry.....	3,458	3,136	....
Artillery.....	20,549	12,497	3,210
Engineers.....	6,603	3,472	....
Pioneers.....	....	....	104,525
Auxiliary Troops.....	....	....	104,614
Sanitary Troops.....	4,661	3,178	....
Administrative Troops.....	1,568	723	....
Velocip., Judicial Officers, etc.....	379	39	....
Total.....	137,649	80,602	270,363

TURKEY.—Military service is obligatory upon all Mussulmans over 20 years of age. The Turkish Empire is divided into 7 army districts, each the seat of an army corps. According to the latest official figures the total army strength in time of war was 700,260 men.

UNITED STATES.—The authorized enlisted strength of the army is 25,000 men. There are three major-generals, 6 brigadier-generals of the line, 25 regiments of infantry, 10 of cavalry, 5 of artillery, and an engineer battalion, recruiting parties, Indian scouts, etc.

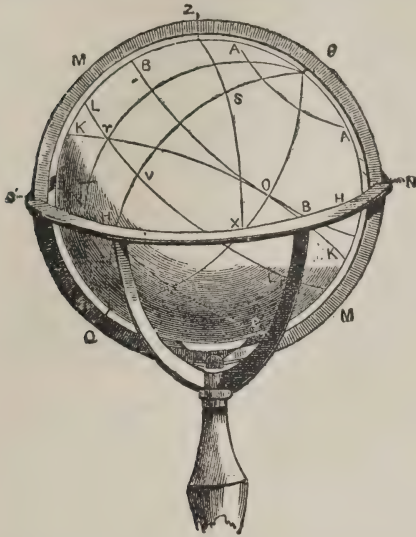
On June 30, 1896, the U. S. army consisted of 2,171 officers and 24,784 enlisted men, aggregating 26,955. See UNITED STATES, INFANTRY, CAVALRY and ARTILLERY.

URUGUAY.—Uruguay has an army of 3455 officers and men, including 4 battalions of infantry, 4 regiments of cavalry and 1 of artillery. The national guard is 20,000 strong. There is an armed police force of 3,200 men, and an active civilian force of 3,264.

VENEZUELA.—The army in 1895 numbered 4000 men in the regular service. There is also a national militia in which every citizen from 18 to 45 must be enrolled. Wars have been chiefly carried on by the militia, which at times has numbered 60,000.

ARMIL LARY SPHERE (*armilla*, a ring), an instrument intended to give a just conception of the constitution of the heavens, and of the motions of the heavenly bodies, as seen by an observer on the earth. It consists of a number of rings fixed together so as to represent the principal circles of the celestial sphere, and these are movable round the polar axis within a meridian and horizon, as in the ordinary celestial globe. It was by means of such rings furnished with sights that Hipparchus, Ptolemy, and other ancient astronomers made many of their observations, and we find even Tycho Brahé making most of his planetary observations with the help of such an instrument. The A. S. is, however, now only used as an aid to instruction in astronomy, and in this respect is generally supplanted by the celestial globe. The object aimed at in the A. S. will be better understood by reference to the celestial globe represented in the diagram. Supposing the observer on the earth to be in the center of the sphere, the earth on which he stands shuts out from his view the lower half of the heavens, or the part lying below the horizon HH. The hemisphere above him may be regarded as divided into two equal

portions, an eastern and a western, by the meridian MM, which passes through the pole



P, and the zenith Z, of which the eastern half is shown in the figure. The north pole is supposed to be elevated above the horizon, and its elevation is measured by the arc NP, or the height above the n. point; and the heavens appear to rotate round an axis PQ, of which P is one extremity; the south pole, Q, the other extremity, being below the horizon. The meridian MM, and the horizon HH, are the only circles which maintain a fixed position with regard to the observer. Of the other leading celestial circles, the equator or equinoctial LL, extending from the e. to the w. point of the horizon, the tropics of Cancer and Capricorn, respectively BB and CC, and the arctic circle AA, although rotating with the stars, maintain the same position with regard to the horizon; while the ecliptic, KK, is constantly changing its inclination and position towards it. Circles which extend from pole to pole, cutting the equator at right angles, are called circles of declination. The circle which passes through the vernal equinox γ (see ARIES), is denominated the equi-

noctial colure; and that passing through the summer solstice O (see SOLSTICE), the solstitial colure. The circles just named, together with the antarctic circle, are represented by corresponding rings in the A. S. If S be a star, the following are the names given to the arcs which determine its position with regard to these circles: γ V, right ascension; SV, declination; SP, polar distance; SZ, zenith distance; XS, altitude; (XN $+ 180^\circ$), azimuth reckoned from the south pole westward.

ARMINIUS, JACOBUS, the founder of Arminianism, was b. at Oudewater (Old Water) in 1560. His real name in Dutch was James Harmensen; but in accordance with the prevailing custom amongst scholars in those days, he Latinized it. His father was a cutler, and died when A. was a child. After a preliminary education at Utrecht, he commenced (in 1575) a course of study at the newly-founded university of Leyden, where he remained for six years, and where he seems to have acquired a high reputation, for the Amsterdam merchants undertook to bear the expense of his further studies for the ministry, on condition that he would not preach out of their city unless permitted to do so. In 1582, he went to Geneva, and received the instructions of Theodore Beza, the most rigid of Calvinists. Here he made himself odious by the boldness with which he defended the logic of Peter Ramus, in opposition to that of the Aristotelians of Geneva, and in consequence had to retire to Basle, whither his fame must have preceded him, for he was offered by the faculty of divinity in that university the degree of doctor gratis, which, however, he did not venture to accept, on account of his youth. At Basle he studied under Gyrnæus. He subsequently (1586) traveled into Italy. On his return to Amsterdam (1588), he was appointed minister. Shortly after this, he was commissioned to defend the doctrine of Beza, regarding predestination, against the changes which the ministers of Delft had proposed to make on it. A. carefully examined both sides of the question, but the result of his study was, that he himself began to doubt, and at last came to adopt the opinions he had been commissioned to confute. Some time after this change of view, he came, in the course of his expositions, upon the epistle to the Romans, the most explicitly doctrinal in the New Testament, and the 8th and 9th chapters of which have always been considered the strongholds of Calvinism. His treatment of this epistle excited much dissatisfaction, and involved him in sharp disputes with his orthodox brethren. Still his views were, as yet, either ambiguously or vaguely expressed, or, at least, had not attained to that clear consistency they subsequently acquired, for in 1604 he was made professor of theology in the university of Leyden.

The greatest enemy of A. was Francis Gomar, his colleague in the university of Leyden. In the course of the year 1604, the latter attacked his doctrines, and from that hour to the end of his life, A. was engaged in a series of bitter disputes with his opponents. The *odium theologicum* was never exhibited in more unmingled purity. Arminius asserted, in substance, that God bestows forgiveness and eternal life on all who repent of their sins and believe in Christ; he wills that all men should attain salvation, and only because he has from eternity foreseen the belief or unbelief of individuals, has he from eternity determined the fate of each. On the other hand, Gomar and his party, appealing to the Belgic confession and the Heidelberg catechism, maintained, that God

had, by an eternal decree, predestinated what persons shall, as being elected to salvation, be therefore awakened to repentance and faith and by grace made to persevere therein; and what persons shall, as being rejected (*reprobati*), be left to sin, to unbelief, and to perdition. See PREDESTINATION, PERSEVERANCE OF SAINTS.

While these fierce disputes were continuing, A., who was not destitute either of friends or influence, was created *rector magnificus* of the university, but resigned the honor on the 8th of Feb., 1606, having held the office only for one year. All the pulpits in Holland now fulminated against him. At length, in 1608, A. himself applied to the states of Holland to convoke a synod for the purpose of settling the controversy; but, worn out with care and disease, he died, on the 19th of Oct., 1609, before it was held, leaving seven sons and two daughters by his wife, Elizabeth Reael, daughter of Laurent Reael, a judge and senator of Amsterdam.

There can be no doubt that A. himself was much less Arminian than his followers. He had not matured his opinions sufficiently to elaborate a complete system of anti-Calvinistic doctrine, though it is perfectly certain that the conclusions at which his disciples arrived—as stated in the famous “Five Articles”—are the logical and legitimate results of his teaching. He always complained, however, that his opinions were misrepresented; but this is invariably the fate of controversialists, and the penalty of controversy. A. was an extremely good man, as even his enemies allow; his abilities were also of a high order; his thinking is clear, bold, and vigorous; his style remarkably methodical, and his scholarship respectable, if not profound.

After the death of A., his followers gained strength, and boldly asserted their views, but still remained in a minority. In 1610, they presented to the assembled states of the province of Holland a “remonstrance”—from which they were styled “Remonstrants”—which contained the following propositions: 1. That God had indeed made an eternal decree, but only on the conditional terms that all who believe in Christ shall be saved, while all who refuse to believe must perish; so that predestination is only conditional. 2. That Christ died for all men, but that none except believers are really saved by his death. The intention, in other words, is universal, but the efficacy may be restricted by unbelief. 3. That no man is of himself able to exercise a saving faith, but must be born again of God in Christ through the Holy Spirit. 4. That without the grace of God, man can neither think, will, nor do anything good; yet that grace does not act in men in an irresistible way. 5. That believers are able, by the aid of the Holy Spirit, victoriously to resist sin; but that the question of the possibility of a fall from grace must be determined by a further examination of the Scriptures on this point.

This last point, left as an open question, was decided by the Remonstrants in the affirmative soon afterwards (1611). Whereupon the Gomarists (Calvinists) put forth a strong “counter-remonstrance,” asserting plainly absolute predestination and reprobation. After several fruitless discussions, the states of Holland, in Jan., 1614, acting under the advice of Oldenbarneveld, a senator, and the learned Hugo Grotius, issued an edict of full toleration for both parties, prohibiting at the same time the continuance of the controversy. The counter-remonstrants (or Calvinists) refused to submit to this edict, and the strife soon became so furious, that in 1617, or soon afterwards, the Arminians found it necessary to guard themselves from personal violence by appointing a safeguard of militia-men (*Wardgelders*). The controversy now merged in the strife of party politics. The ambitious Maurice of Orange took advantage of the passions of the majority to crush his opponents of the republican party, whose leaders were adherents of the Arminian doctrines. Several Arminians were put to death—among them the aged senator Oldenbarneveld, May 13, 1619—while Grotius and others were imprisoned. In these circumstances, the synod of Dort was held (1618–1619), attended by selected representatives from the Netherlands, England, Scotland, the Palatinate, Switzerland, Nassau, East Friesland, and Bremen. From this convocation (Jan. 14, 1619), the 13 Arminian pastors, with the learned and eloquent Simon Episcopius at their head, were excluded. The doctrines of the counter-remonstrants were embodied in 93 canons; the Belgic confession and the Heidelberg catechism were confirmed as authorities for the reformed churches of the Netherlands; and 300 Arminians (chiefly preachers) were expelled from office. In consequence of this decision, the defeated party sought shelter in France, Holstein, England, etc. Afterwards, under Frederick-Henry, the stadtholder after Prince Maurice (1630), they were again tolerated in Holland, and in 1634 Episcopius opened his theological college in Amsterdam.

Since that time, the remonstrants (or Arminians) in Holland have inclined more and more towards freedom of thought on religious questions, and independence in church government. The rejection of all creeds and confessions; the free interpretation of the scriptures; a preference of moral to doctrinal teaching; Arian views respecting the Trinity; the virtual rejection of the doctrines of original sin and imputed righteousness, and the view of the sacraments as merely edifying forms or ceremonies; all these and other points of belief display the same tendency which is found in their church polity. Their annual conference on ecclesiastical affairs is composed of ministers and lay-deputies, and takes place in June, alternately at Amsterdam and Rotterdam. The number of remonstrants is now only about 5000, and is still decreasing. In 1809, they had 34 congregations with 40 preachers in Holland; but in 1880, only about 20 congregations. The largest society of Arminians is in Rotterdam, and numbers only 600 members.



ANCIENT ARMOR.—I (Egyptian), 4, 6 (Roman) Coats of mail. 2. Tournament in the 13th century. 3. Lance-guards. 5. Knee-guards. 6. Lance-hook. 7. Tourney-shield. 8. Helmet. 9. Lance. 10. Lance-guard. 11. Lance-guard. 12. Lance-guard. 13-23. *Weapons of 13th Century*: 13. Knightly garb, end of 13th century. 14. Mark (cimierd) and shaloon. 15. Helmets. 16. Lances. 17. Scale gauntlets. 18. 19th century. 20. Grecian and British helmets. 21. 22. German lance-heads. 23. 17, 18 (Danish) arm-shields. 19, 20. Battle-axes. 22, 23. German shields. 24, 25,



1 century. 3-12. *Armor of the 16th Century*: 3. 'Tourney-armor built up from war-armor. 9. Horse-helmet. 10. Right and left gauntlet. 11. Blunt lances for tourneys. 12. Battle-axe. 13. Shields. 14. Scales. 15. Swords. 16. Ends of bawdrick, or baldrick. 17. Helmet with distinctive crest. 18. Spring. 19. Battle-axe. 20. Gauntlet. 21. Scabbard. 22. Shield and helmet, used in the beginning of the 12th century. 23. Spur, end of 12th century. 24. Sword. 25. Scabbard. 26. Sword. 27. Grecian quiver.

Although the Arminians are thus dwindling away as a distinct body, their tenets respecting predestination have been adopted with greater or less modification by several other Christian denominations (see **METHODISTS**, **BAPTISTS**); as well as by multitudes of the individual members of those churches whose formularies are Calvinistic (see **CALVINISM**). They are also very prevalent in the church of Rome.

ARMINIUS. See **HERMANN** or **HERMAN**.

AR MISTICE, a suspension of hostilities between two armies, or two nations at war, by mutual agreement. It sometimes takes place when both are exhausted, and at other times when an endeavor to form a treaty of peace is being made. A particular example will best illustrate the nature of an A. On the 25th of Feb., 1856, the representatives of England, France, Austria, Prussia, Sardinia, Turkey, and Russia, met in congress at Paris, to consider the terms of a treaty of peace which should terminate the war at that time going on between five of the above-named powers. The British nation was very unwilling to suspend hostilities during the sitting of the congress—partly on account of the numerous failures of diplomacy in the preceding year, and partly because Russia was suspected of only wishing to gain time. It was agreed, however, at the first sitting, in conformity with the laws of nations and the usages of war, that an A. should be declared, to be announced by telegraphic message to the commanders in the Crimea, and to last until the 31st of March. During that period of about one calendar month, the hostile armies were to remain strictly at peace, but the fleets of the allies were to continue their blockade of Russian ports. The information reached the generals late on the 28th of Feb. On the morning of the 29th, a white flag was hoisted in the Russian camp outside Sebastopol; several Russian officers assembled around it; and a glittering cavalcade of British, French, and Sardinian officers proceeded thither. The accredited officers compared notes, found the terms of the A. clear, agreed on a boundary-line between the hitherto hostile forces, and formally gave pledges for a cessation of fighting. The courtesy of civilized nations at once succeeded to the horrors of war; the Russian commander gave a magnificent entertainment to the allied commanders, and was entertained in turn; the soldiers "fraternized" by little gifts of tobacco, and ludicrous attempts at conversation, across a small stream which formed part of the boundary-line; and a few British officers were permitted to make excursions into the interior of the Crimea. The A. ended on Mar. 31, not by a renewal of hostilities, but by the signing of a treaty of peace.

ARMITAGE, EDWARD, an English historical painter, b. May 20, 1817. He was educated in Germany and France, and was a pupil of Delaroche in 1837. In 1843 he gained the first prize for cartoons, and in 1847 a prize for oil painting. His more noteworthy frescoes are in St. John's (Roman Catholic) church in London, and in the new houses of parliament. He died May 24, 1896.

ARMITAGE, THOMAS, D.D., b. England, 1819; came to America in 1838, and entered the ministry of the M. E. church. Ten years later he became a Baptist, and he was settled over a Baptist church in New York, retiring 1889. He was active in the organization of the American Bible Union, and a strong advocate of the revision of the Bible, with a view to bringing out what he thought the correct interpretation of the words which relate to baptism. He died Jan. 20, 1896.

ARMOR. All available materials that offer some resistance to edge or point have, at various epochs and among various peoples, been put to use for this purpose, as thick skins, garments of linen or of silk stuffed with vegetable fibre, or made of many thicknesses of material, thin plates of horn or metal, sewed to some textile fabric, and lapping over one another like scales, etc. Usually the headpiece was the first piece of armor to be made in solid metal. The Greeks had a solid cuirass from a very early period. This with the helmet and the greaves constituted the whole armor of the heavy-armed Greek warrior of historic times. The legionary was, in general, similarly armed, sometimes wearing only one greave. Chain-mail was introduced in the armor of the Roman soldiery. The Norman invaders of England wore a conical helmet with a nasal or strong projecting piece of iron coming down over the nose, and long gowns of stuff to which were sewed rings or plates of metal, and the leaders had leg-coverings of similar make.

A century later chain-mail was in common use. The knights of the time of Richard I. of England wore a long hauberk of chain-mail reaching to the knee or below, with long sleeves closed at the ends so as to form gloves, and with openings in the sides through which the hands could pass; hose of the same make, either covering the feet or worn with shoes of strong leather; or sometimes long hose of leather, laced or buckled like modern leggings. A hood, called the camail, covered the head and descended to the shoulders, and upon this rested the iron helmet, either of conical form or rounded. By the time of Henry IV. and his invasion of France (1411) the knight was completely clothed in armor of plates, chain-mail being used at the junction of the limbs with the body, at the elbow and knee-joints, and for a hood covering the top of the corselet. In 1453, about the time the English were driven out of France, the suit of armor reached its complete development, being forged of thin steel to fit the body and limbs, weighing

not over 60 or 70 pounds in all, and allowing of free movement. The armor worn in jousts and tournaments was very different after the 12th century from that worn in war, being heavier, and neither allowing the knight to dismount without assistance nor affording him adequate protection if dismounted. In spite of the adoption of fire-arms armor, though not investing the whole body, continued to be worn by officers and men in war times until the close of the 17th century, in the wars of Louis XIV., and, indeed, survives to this day in the helmets and cuirasses of certain corps of cavalry.

In modern times armor is generally used to denote the metallic sheathing intended as a protection against projectiles for a ship of war, or the exposed face of a fortification. It is also the name given iron wires or pipe enclosing insulated electric wires. Submarine armor is a water-tight covering worn by a diver. The essential part of the armor is the metal helmet large enough to permit free movement of the head within, provided with windows for outlook, and connected with a breastplate which prevents any compression of the lungs. The remainder of the suit is of india-rubber. Pure air is pumped through a tube opening into the helmet, and is projected against the windows, removing the moisture which condenses upon them; it then becomes diffused, and is breathed, the impure air passing out through a similar tube. Weights are attached to the waist and leaden soles to the shoes. A ladder is used to descend part way, and a signal line kept constantly in the hands of attendants serves as a means of communication.

ARMORER. Formerly a maker of or an expert in armor, hence, one who had the care of the arms and armor of a knight or man-at-arms, and equipped him for action. In modern use the armorer is the custodian or manufacturer of military arms, and has the supervision of any collection or equipment of arms. In the British army an armorer is attached to each troop of cavalry and to each company of infantry to clean the arms. Aboard a man-of-war the armorer and armorer's mate did the blacksmith work of the vessel, but in late years the armorer is a petty officer and one of the gunner's gang, his duties being the care of the arms used by the ship's company. Aboard ship each man is not responsible for the care of his weapon, as is the case with soldiers.

ARMORICA, the country of the Armorici, i.e., "the dwellers on the sea" (Celt. *ar*, on or near, and *mor*, sea), the name by which the people occupying the coast of Gaul between the Seine and the Loire were known to Cæsar. At a later period the name *A.* was confined to the country afterwards styled *Britannia Minor*, or *Bretagne* (q.v.).

ARMOR PLATES. The modern system of the employment of armor-plating is the practical realization of plans suggested years ago by Marsenne and others. In 1842 Mr. Balmano, of New York, proposed that war-ships should be clad with several thicknesses of iron plate, riveted one upon another, the plates being individually $\frac{1}{2}$ of an inch thick. Soon afterwards, Mr. Stevens, of Hoboken, a ship-builder, made further suggestions on the same subject, and other practical men kept the matter before the attention of the authorities of the various countries. In 1854 the French sent several floating batteries to the Black Sea clad with iron plates; and the English admiralty hastily imitated their example, producing eight very slow and unmanageable batteries in 1855 and 1856. This was followed by numerous suggestions for placing armor upon the entire wooden fleet. In 1860 the French sent *La Gloire* to sea, a timber-built 90-gun three-decker, altered to a 40-gun corvette, and clad with $\frac{1}{2}$ inch iron plates. This set the English government at work about the creation of an armor-clad navy. Many problems had to be solved: whether to case old wooden ships with armor; to build and case new wooden ships; or to build new vessels of which the hull as well as the armor should be of iron. These gave rise to the additional problems of how near the bulwarks should the armor-plates come, how near the bottom of the vessel, how near the stem and stern, what thickness, etc. Experiments at enormous cost have been conducted by the various governments for the past thirty years, and others are in progress to determine the conditions of the utmost practicable resisting power in ship armor, and the utmost practicable destructive power in ship artillery, the result being at first an increase in the thickness of the armor and an additional weight to the guns, followed by a change of material from iron armor to steel armor, and from muzzle-loading guns to breech-loaders.

Plates were at first produced mainly by hammering, several thicknesses of iron being welded one upon another at a white heat by blows of a ponderous hammer; but it is now customary to roll them, and instead of using a number of thin plates, to have one thick one. The distinguished constructing engineer, Dupuy de Lôme, of the French navy, designed the *Gloire* to resist the effect of shell-fire, and a complete layer of comparatively thin iron over the wooden hull was sufficient to resist penetration from the rifled guns of the period. The *Warrior*, built in England in May, 1859, followed, but her protection was less extensive. They were far-sighted enough, however, to build the hull of their new vessels of iron, thereby prolonging their lives, so to-day many can be brought to meet the new conditions of resisting detonating-shell fire. Then the French built the *Magenta*, of wooden hull covered by 4.7 inches of iron armor. The Italians ordered in 1860 two completely armored cruisers in France, the *Terrible* and *Formidabile*, French types: hulls and armor of iron. The order for the first Spanish ironclad was given in the same year—iron broadside armor on a wooden hull. The Italian vessels were of 2600 tons displacement, and their armor was 5.53 inches thick, the heaviest so far attempted. In giving the names and sketches of the vessels of the principal naval

powers, those that are types of the naval construction of their day are alone selected, no attempt being made to include all of the vessels of any one navy built during a specified year. (For numbers of vessels of various navies see NAVIES, MODERN.)

In 1861 the *Monitor* and *New Ironsides* were ordered in the United States (for further information in relation to U. S. ironclads see latter portion of this article), the latter of the broadside type. The effect of the action between the *Monitor* and *Merrimac* in 1862 is shown by the class of vessels ordered in Europe in 1863, and in Russian construction for succeeding years. The *Minotaur*, built by England in 1861, was a monster vessel of 10,690 tons displacement, hull of iron, with armor 5.5 inches running entirely around the vessel at the water-line and including her battery deck. In the latter part of 1861 the Russians changed the plans of the wooden frigate *Petropaulovsk*, then building, and gave her a complete water-line belt and casemate of iron 4.5 inches thick. In 1862 the Italians built the *Maria Pia*, the only new type vessel, both hull and armor of iron, the latter 4.33 inches thick being about the water-line and casemate, the departure from existing types being the introduction of separate gun positions for bow and stern guns. In 1863 placing the guns in armor-plated turrets was tried by England in the *Royal Sovereign*, which had four turrets covered with 5.5 inches of armor. This was one of the last wooden hulls in England that had iron armor plating. The French in the *Taureau* had the water-line armor belt 5.9 inches thick carried well forward to include the ram bow, and placed the guns in separate positions, surrounding them by 4.7 inches of armor. Italy in the *Affondatore*, does away with casemate armor, but thickens that at the water-line to 5 inches, and places her guns in separate positions, using 5.9 inches of armor to protect them. Russia changes the material of her hulls from wood to iron, and adopts the low freeboard monitor type in the *Smertch*, giving the platform 4.5 inches of armor-plating and the two turrets 6 inches, the thickest armor so far used. The Germans ordered from England their first armored vessel in 1863, the *Arminius*, of the monitor type. In 1864, Italy, in the *Venezia*, increases her water-line plating 5.9 inches, placing it over a wooden hull, reintroduces the casemate, covering it with 4.7 inches of armor, and has only a forward gun in a turret. The Russians continue in the *Admiral Lazareff* the monitor type, and while doubling the displacement of vessels built the previous year, keep the armor at the same thickness. In 1865, France, in the *Alma*, introduces separate gun positions amidships and above the casemate, but does not increase the armor, and builds the hull of wood, as does Italy in the *Palestro*. The latter vessel has a displacement of over 6000 tons, and her water-line armor is increased to 8.7 inches. She also introduces a divided casemate, leaving the midship portion above the water line unarmored, but protecting the ends with 6 inches of armor. In 1866 England builds the *Hercules* of iron, gives her a strong ram bow, covers the water line with a broad belt of 9 inches of armor, and places her guns in a central casemate protected by 6 inches of iron plating. The same year she builds the *Monarch*, which combines several of the ideas already adopted. The central casemate has two turrets mounted above it covered with 10 inches of armor; there is a separate armored gun position forward, and the water-line armor-belt of 7 inches thickness is very much narrower than that of the *Hercules*. The French carry out in the *Océan* the idea of the central gun positions mounted over the casemate, but instead of the guns being inside the turrets they are mounted on top *en barbette*, a practice they have followed in the *Taureau* and *Alma*, and the plating of these gun positions is continued at 4.7 inches thickness, the water-line plating being increased to 7.9 inches. The Russians in the *Admiral Tchitchakoff*, content themselves with the monitor type, reducing the number of turrets to two, and using 6 inches of armor throughout. The *Audacious*, built by the English in 1867, has two tiers of guns in central casemates, one above the other, covered by 86 inches of plating, the water-line belt of 8 inches of armor not being raised either at the bow or stern. In the *Friedland*, France for the first time adopts the iron hull, using 7.9 inches of armor, and greatly strengthening the ram bow; she carries light guns about the upper deck, placing heavy guns in unarmored barbettes above the casemate, the guns in which are protected by 7.9 inches of armor.

Thus far it will be noted that all the vessels have a complete water-line belt, the increase in thickness from 4.5 inches to over 8 inches being given at the expense of area in battery armor, the English concentrating in a central casemate, the French protecting the smaller guns in the same manner, but placing the heavy guns in barbettes with larger firing arcs, and giving greater attention to the ram bow. The Italians have separate protected gun positions. The turret type of vessel appears in almost all of the English ships built within the next ten years) the *Alexandra* being the last central casemate ship the armor thickness is increased to 12 inches and her ram bow is greatly strengthened. It is now apparent that as the value of heavy guns has increased the secondary battery has been sacrificed in order to give these heavy guns commanding arcs of fire. The increase in the thickness of the armor for gun positions and water-line protection led to shortening the belts, protecting only the vitals of the ship, and resorting to armored deck protection and water-tight compartments for the ends—changes that are apparent from the *Teméraire* in 1873 to the *Inflexible* in 1874, the *Conqueror* and *Colossus* in 1879. The last two have hulls built of steel and use compound armor of an extreme thickness of 18 inches. The French during this decade, 1869 to 1879, continue to adhere to the complete water-line belt, but at the expense of gun protection. In 1879

in the *Redoubtable*, they introduce steel into the hull, using both it and iron, and in 1877 in the *Indomptable*, they first use compound armor 19.7 inches thick, jumping up the following year, in the *Amiral Baudin*, of 11,300 tons displacement, to 21.65 inches. The heavy guns are well above the water in armored barbettes of a maximum thickness of 17.7 inches, with ammunition tubes, giving protection to the carriage and to the loading of the gun. To minimize the chances of destruction of the whole main battery, these heavy guns are placed in as widely separated positions as possible, the secondary batteries, comprising a number of 14 to 16 centimetre guns, are carried. In this same period the Italians gave up their separated gun positions; in the *Duilio* and *Dandolo* 11,607 tons displacement, they have two turrets covered with 17.72 inches steel armor on a central citadel, and dispense with a secondary battery. The water-line belt of 21.3 inches thickness is shortened and the ends have a protective deck. The hulls are of iron and steel, and the use of the latter for armor now, 1873, makes its first appearance. Three years later the short armor-belt in the above-named ships is given up in the *Italia* and *Lepanto*, of 15,360 tons, where the floating power is dependent upon a cellular raft over a protective deck; the four 16.97-inch guns are carried in an armored central barrette of 19 inches compound armor (here first introduced, 1876) with armored ammunition tubes 17.8 inches thick. The secondary battery distributed about the unarmored deck is composed of sixteen 6-inch guns. The Italians were the first to perceive the necessity of a large displacement, in order to properly fill the requirements of a first-class battle-ship in regard to offense, defense, speed, and cruising power; that is, to carry the necessary weights of guns, armor, machinery, and coal; as well as the first to use steel and compound armor. The Russians after building the *Petr Veliki*, in 1869, with double turrets, water-line, and casemate iron armor on a wooden hull and the *General Admiral* after the French type of complete water-line belt and barrette guns, introduced no especially distinctive types in the ten years ending in 1879. After this, however, a reaction towards gun-protection is shown in the *Tchesma* class, where the six heavy guns, still in barrette, are mounted on disappearing carriages in a triangular central redoubt. The complete water-line belt is given up, and the ends are protected with an armored deck three inches thick. In some of their new constructions on the Black Sea they return to turrets, while on the Baltic a type represented by the *Alexander II*, built in 1884, is the favorite, in which to meet the demands for resistance to detonating shell, the isolated armor on gun positions is reduced to 10 inches for the larger gun and 6 inches for the smaller, while the water-line belt is continued at 14 inches. The Italians in the *Lauria* class, built in 1881, revert to the partial belt, with armored desks for water-line protection, and for the heavy guns in barrette they have a strong central redoubt carrying 19.7 inches of armor-plating. The secondary battery protection is deemed unimportant. Their latest class is the *Re Umberto* changed from the original plans of 1884 to what were finally adopted in 1888. There is a strong central redoubt with heavy guns at either end in barrette, a powerful secondary battery casemate being amidships and heavy armor-plated decks protecting the ends of the water line. The floating power is maintained by a very effective cellular protection, which extends down to the bilge, forming, practically, a triple hull. This is the first departure from the net to hull defense against torpedos.

The French in the decade just closed adhered to the armor-plating at the water line, the *Marceau* in 1880 and the *Hoche* the following year carrying 17.7 inches. A change in gun protection is noticeable in the latter from that shown by her sister ship of the previous year, as the barrette, with its light shield, is changed to a completely covered barrette or modified turret. Each of the heavy guns is carried in a separate armored position over an armored redoubt; an arrangement of the primary battery rather costly in weight of armor. In these new vessels the guns are mounted in pairs in end turrets, the latest design, the *Tréhouart*, of about 10,500 tons giving up barbettes entirely for turrets. In 1888, after thirty years, the appearance of the detonating shell presents the same problem as that solved by the designer of the *Gloire* and the name of the vessel built that year was very aptly selected, *Dupuy de Lôme*. Armor completely covers all but the extreme forward part of the water line, where the protective deck is depended upon; both heavy guns and a number of lighter ones are at the forward and after ends with an armored position amidships. The English started in 1880 with the *Collingwood*, a barrette ship with 12 inches of armor on the barbettes, ammunition tubes protected by 16 inches of armor, but provided no protection immediately below the barbettes. There is a 2.5-inch protective deck, but the armor-belt for water-line defense, although 18 inches thick, is quite short. This typical ship of the "Admiral class" was followed by an enlarging of the dimensions. These vessels carry a secondary battery of six 6-inch guns. In 1881 the *Impérieuse* and *Warspite* were built on a model that shows the influence of the French vessels of the *Marceau* type. Their thickest armor was 10 inches on the water-line belt, covering somewhat less than half the vessel's length amidships. The main battery is mounted in three separated positions, one forward, a second amidships, and the third aft. Three inches of armor protect the ammunition hoists and a similar thickness forms the protective deck. The *Trafalgar* and *Nile* in 1886 present a superior type of battle-ship. There is a 20-inch armored redoubt amidships having turrets carrying 18 inches of armor-plating at either end, the upper portion of the redoubt is 4 inches in thickness and protects the secondary battery of 4.72-inch rapid-fire guns. That portion

of the water line not covered by the armor depends on a curved steel deck for protection.

In the latest designs of English battle-ships, the irresistible logic of events has forced the displacement above 14,000 tons; the water-line defense is of the same character as on the *Trafalgar*, the maximum thickness somewhat reduced; but to make room for a larger secondary battery, the heavy gun positions are moved farther apart, and this compelled separate redoubts under each pair of guns, instead of the *Trafalgar's* central citadel. The end protection of the secondary battery is the same, 5 inches, and a 5-inch steel belt is run between the redoubts, thereby giving protection against detonating shell beneath four of the ten guns. There is no armor abreast the secondary battery, but each gun is protected by a separate closed shield or turret. Few if any of the vessels with complete or partial water-line belts have these of sufficient depth to give proper protection when rolling; this defect is minimized, of course, in the large types of from 13,000 to 15,000 tons displacement which do not roll appreciably in any seaway that permits ordinary vessels to work their guns. Another defect is the incomplete protection given to the chase of the heavy and important guns, even against light projectiles from rapid-fire guns that can disable them quite easily. In the original monitors the turrets completely enclosed the guns, except when ready to fire; in the *Temeraire* the short barbette guns presented no difficulty to the use of a disappearing mount. With the introduction of the long, high-powered guns the protection was not extended, and is complete only for the carriages and loading arrangements. More or less has been said in the above descriptions of recently constructed vessels in relation to detonating shell, and measures of protection that their introduction has rendered necessary. So far these shells have not been able to keep intact long enough to penetrate any but the lightest armor, the English meeting them with 5 inches and the French with but 4 inches of steel side armor, while even in unarmored cruisers the gun shields or turrets are not over 4 to 4.5 inches thick.

The United States built during the civil war a large number of monitors, the *New Ironsides*, the *Galena* and various other vessels of war more or less covered with armor-plating. The Confederates, beginning with the old wooden steam frigate *Merrimac*, which they cut down and covered with armor, continued to build ironclad rams until toward the close of the struggle. With several of these the United States vessels had some very spirited encounters. Since the introduction of armor there has been no sea fight that has been of greater moment than that which took place in Hampton Roads, Virginia, on March 9, 1862, between the *Monitor* and the *Merrimac*; it revolutionized ship-building and created a great demand abroad for the *Monitor* type of ironclad. The single-turreted *Monitor* was greatly improved upon, and larger and more heavily clad vessels were designed. Double turrets were also introduced, and monitors of shallow draught were built for river service. When the civil war closed there was a large number of ironclads of various types that were either sold or broken up, until, in 1881 there were but 24 remaining, not one of which was protected with even the modern armor of that date. There are now but 13 single-turret monitors left, and 5 double-turreted, these latter, however, although retaining the same name, are by no means like the originals. The single-turreted vessels vary in displacement from 1875 to 2100 tons displacement, and have side armor—laminated type—about five inches thick. The turret armor being between 10 and 11 inches in thickness. Of double turreted monitors there are five, one of which, the *Puritan*, is of 6000 tons, the other four being of 3815 tons. These vessels have been entirely rebuilt from what they were originally, and when completed will be very efficient coast defense vessels. For example, the *Puritan* will carry a battery of four 12-inch rifles in covered barbettes, and six 4-inch rapid-fire guns, two on spigons in the superstructure between the barbettes, and four on top, in the four corners. The barbette armor is 14 inches and the side armor tapers from 14 inches toward the ends. The *Texas* is a battle-ship carrying 12 inches of armor at the water line. An armored redoubt runs diagonally across on main deck enclosing and protecting bases of turrets and their machinery, this, as well as the armor on the turrets (*en échelon*) is 12 inches thick. The conning tower has the same protection. The ammunition tubes have 6-inch, and tube from conning tower down to protective deck 3-inch, protection. The protective deck, 3 inches thick, covers the armor belt and curves down forward and abaft it to stem and stern. The main battery is two 12-inch and six 6-inch rifles, speed, 17 knots, displacement 6300 tons. The armored cruiser *Maine* has her 10-inch guns mounted in barbette turrets *en échelon*, the 6-inch guns are two in recessed bow ports, two similarly placed in quarter ports, and two on superstructure deck in broadside. The protection consists of an armor-belt 180 feet long, having a thickness of 12 inches. Above it are oval redoubts carrying 10 to 11.5 inches of armor. The conning tower is 10 inches thick, and a 4.5-inch tube runs down from it to the protective deck. This deck is 2 inches thick over the belt and 4 inches where it slopes down aft between its ends; forward and abaft the belt the deck is 2 inches thick. The *Monterey*, building in San Francisco, is of the low freeboard monitor type, built on the bracket system, and like the two above-named vessels has a double bottom and numerous water-tight compartments. The estimated speed is 16 knots at a displacement of 4000 tons. She is to carry two 12-inch rifles in a forward barbette, two 10-inch in the after barbette, and like all the modern vessels a numerous secondary battery of rapid-

fire and machine-guns. A complete belt of armor 13 inches thick runs around the vessel at the water line, 14 inches cover the forward barquette, and 11½ inches the after. 8-inch sloping shields protect the heavy guns. A complete protective deck has a thickness of 3 inches over the vitals and 2 inches at the ends, the conning tower having 10 inches of armor. A first-class armored cruiser of 8150 tons is under construction, and is designed to make 20 knots an hour. She will carry six 8-inch and twelve 4-inch rifles in her main battery. The hull is to be protected by a vertical belt 3½ inches thick over the machinery space, and by a steel protective deck 2.5 to 6 inches thick from stem to stern. Within the armor belt and above the protective deck, a copper dam 3½ feet wide, for water-excluding material, is to extend the whole length of the vessel.

Three sea-going coast-line battle-ships designed to carry 17 inches of armor for a length of 164 feet and to be of 8500 tons displacement have been begun. An armor deck 2½ inches thick will be worked over the deck, with a submerged deck 3 inches thick running from the armor bulkheads to the ends of the vessel. The main gun positions are two in number, one forward and the other aft on the midship-line, each to contain two 13-inch rifles; armor 17 inches thick worked on a backing of 6 inches, will protect these positions. The secondary battery of four 5-inch guns will be in 3-inch thick barbettes on the upper deck, also protected by gun shields 3 inches in thickness. Their engines are to develop 7500 horse-power and a speed of 15.8 knots. Their length is 314 feet, beam, 68 feet, draught, 23½ feet. The other vessels building are not armor-clads, the "Ammen" ram excepted. She is to have no guns, but depends on her ramming qualities. Her armor tapers from 6 inches to 2½ inches. She has a curved upper deck and when ready for action is submerged much deeper than under ordinary circumstances. Her conning tower has 18 inches of armor. Her speed will be 17 knots. Following the adoption of iron in 1860 as a metal for protecting vessels, came numbers of experiments conducted at an enormous cost, to determine the best quality of that metal to use.

In 1865 a committee in England reported as the conclusion to which their experiments had determined them, that the best material for ship's armor was wrought iron of the softest and toughest quality. The perfecting of machinery at the rolling mills made it possible to roll much larger and thicker plates, so that instead of a number of thin plates bolted together as was the method used in this country, one thick plate was made to answer. The Italian admiralty tested on an unprecedented scale the relatively defensive properties of iron and steel armor in 1876, and decided on the adoption of steel-faced armor or compound armor. This kind of armor was thought to possess these advantages: that the front plate being of steel resists perforation better than iron, breaking up or rendering unavailing projectiles, while the steel and iron plate does not crack as would steel alone. England again had extensive experiments, and three years later she adopted compound armor. France took up the same, then tried steel, and afterwards returned to compound. The Cammell and the Brown plates on the compound principle were the chief dependence in England, and at various competitive tests, during the first efforts made to produce reliable steel, these plates gained numerous victories. The French (at Le Creusot) were working away at steel, and in 1886 scored some excellent results. The gun used was 9.45 inches calibre, the projectile was chilled cast-iron weighing 317 pounds, the powder charge 71 pounds; the plate being about 9.5 inches thick. At the end of the trial, four rounds, no portion of the plate was broken off or detached, all bolts remained intact, and the backing was uninjured. The plate was badly cracked in four directions. The projectiles broke up, the heads of the third and fourth stuck in the plate. In January, 1887, a second lot of very satisfactory plates was tried with results quite like the above. In June, 1886, Saint Chamond compound plates were subjected to four shots from a 7.5 inch gun, firing a 165 pound shot with 54 pounds of powder. The result was the cracking of the plates in rear of the last two shots fired. The plate was, however, in good enough condition to stand other similar projectiles before being knocked to pieces. In April, 1886, a Cammell plate made on a new patent, was specially hardened on the face to withstand penetration, and in addition to the usual iron backing, it was further strengthened by a third strake of soft iron. Three rounds were fired from an 18-ton muzzle-loading gun at a range of thirty feet with a charge of 70 pounds, and a chilled iron projectile of 400 pounds. No damage was done the plate with the exception of bruising its face. The struggle between armor and projectile was continued during the following year on a grand scale, as well as the trials between the different types of armor. With the improvement of the steel projectile the steel face of compound armor was gradually hardened, until it contained (in 1887) 40 per cent. more carbon than formerly. Some all-steel manufacturers experimented with plates having an especially hard face plate, 1½ to 2 inches in thickness, secured to the main body by bolts. On October 20, 1887, a target in England was faced with a 16-inch compound plate (Brown's) and was fired at with a 714-pound Holtzer projectile. The plate was broken in two parts and cracks were developed all over its surface. The shot after passing through the plate perforated the ten feet of solid backing, and was finally arrested by an old armor-plate in the rear. When removed the projectile was found to be intact, and so little deformed that apparently it could have been fired again. A similar projectile was fired against a Cammell plate set at an angle of 45°. The striking velocity of the projectile corresponded to an energy of 17,500 foot tons. The

head and part of the body were embedded to a depth of 7 or 8 inches, when the projectile broke up. In March, 1888, two 6-inch Holtzer shells were fired against a Brown 9-inch compound plate. The first shell perforated the plate without further injury than a slight cracking in the head; the second failed to get through. During the same month, near Paris, two rounds, with Holtzer projectiles weighing 95 pounds, were fired against a 5.5-inch Creusot plate. The first shot caused three long but unimportant cracks which the second enlarged and also caused a new one. Two 8-inch shells of the Firing pattern were fired against a 12-inch compound Brown plate, both of which perforated the target. In Russia, in July, 1889, a St. Chamond (French) projectile weighing 714.5 pounds was fired against a Wilson compound plate which it fractured. A Krupp 304-pound projectile fired the same year from an 8.27-inch gun with 103.6 pounds of powder against a Cammell compound plate 15.5 inches thick, badly shattered and cracked the plate. Austria at this same time made some experiments to test the comparative resistances of the Krupp cast-steel and the Leobersdorfer chilled cast-iron armor at long range, the result being considered by the Austrians in the light of a decided victory for the armor of domestic manufacture. In the trials at Portsmouth, England, in 1888, a Cammell compound plate 10.5 inches thick, having between 0.9 and 1.0 per cent. of carbon in its face was the target. Against this three Holtzer 6-inch armor-piercing shells and two Palliser shells were fired with a charge weighing 48 pounds. The Holtzer shells remained sticking in the target, producing superficial cracks; the Palliser shells were broken up completely. The plate showed itself to be of the highest quality. An all-steel Cammell plate that underwent a similar trial, though cracked in places retained its position on the backing and was in a fair state of preservation. A Vickers all-steel plate having .34 per cent. of carbon, fired at under similar conditions to the above, developed the following striking features: Although the projectiles penetrated, they all rebounded several feet from the target, giving proof of its wonderful elasticity. A Brown steel plate was bulged slightly at the back. The deepest bruise was but 8 or 9 inches deep, showing that the effect upon the hull of the ship it protected would be almost *nil*. In May, 1890, another trial was had with a Cammell compound plate, the gun being of 6-inch calibre, and the projectiles two Palliser chilled heads and three hard steel Holtzer shells. The angles of the armor were first assailed, and after it had been thus thoroughly tested, a fifth round, with a steel shot, was directed at the centre. The chilled headed projectiles were reduced to little more than dust by collision with the steel face, while the French (Holtzer) projectiles were considerably splintered, the heads remaining embedded in the plate. At the fifth round the projectile touched the backing. A few cracks were produced in the plate, but it was evident that under the prescribed test the screw of a ship would have been protected against shell fire. Competitive trials of four compound armor-plates took place in November, 1889, off Heldee, North Holland. Three of the plates were manufactured on the Wilson system by Cammell, St. Chamond, and Marrel, respectively, and the fourth on the Ellis system by Brown. These plates were 9 feet long, 6 feet, 11.06 inches wide, 11.02 inches thick, and were placed side by side on the deck of a large barge. Each plate weighed about 12.5 tons. The gun used was a Krupp 11.02-inch, firing a projectile weighing 566.6 pounds, with 121.3 pounds of powder. The trial resulted in favor of the English-made plates. Both French plates were originally somewhat weakened by the greater number of bolts used in securing them to the backing; St. Chamond used 30, Marrel 20, Cammell 12, and Brown 8. Now a new alloy makes its appearance and we find nickel introduced with the steel. Early in 1890 the United States advertised for armor to be subjected to competitive trial, and giving the following as the dimensions of the target: 8 feet high by 6 feet wide and 10.5 inches thick. These plates were to be supported by backings exactly similar, and were to be submitted to five shots from an American 6-inch gun. No American firms were found ready to compete, and the only plates represented were two sent by Schneider & Co., of Creusôt, France, and one by Cammell & Co., of Sheffield, England. One of the Schneider plates was all steel, containing a very small amount of carbon, and the other was an alloy of steel with something less than five per cent. of nickel. The Cammell plate was compound armor of hard steel on wrought iron. The targets were about 28 feet from the muzzle of the gun, the trial taking place in September at the Annapolis Naval Proving Grounds. The projectiles weighed 100 pounds and were Holtzer chrome steel fired with 44.5 pounds of powder, and having a striking energy of about 3350 foot-tons. The effect of four shots upon the all-steel target was merely local. Each shot went entirely through the steel, but no cracks resulted. In the nickel target the first shot went through the plate and broke into pieces, causing no cracks whatever. The second shot went 4½ inches beyond the farther side of the target and remained in the hole; the third did the same, going about an inch further; the fourth acted like the first. The Cammell plate was pierced and badly cracked, two of the shot were broken in fragments. The fifth shot at each target was fired from a 8-inch gun, the charge of powder was 85 pounds, and the projectiles, made by the Firing process, weighed 210 pounds. The striking energy was 5500 foot tons. The all-steel target broke the shell into three pieces, all of which were ejected from the hole, which was 16 inches deep. The cracks extended through the centre hole to each corner making an almost regular letter X. The fifth shot at the centre of the nickel steel target broke up into very small pieces, except the head, which remained embedded in the

plate. The latter showed no crack whatever. In view of the results, the Navy Department decided to adopt the nickel-steel alloy for the armor of its new battle-ships. Experiments of a similar nature in Denmark and Russia have confirmed the superiority of nickel-steel. England in 1890 commenced extensive experiments with all-steel, compound, nickel-steel, and other alloys before deciding to renounce compound armor, of which she has been so many years the great advocate. In 1895 the Carnegie Company furnished some plates which the U. S. ordnance department found impossible to penetrate or crack. A 17 in. Harveyized plate was reheated and rolled down to 14 in. The surface carbonization was then completed, and the surface sprayed with ice-water to produce chilled hardening. This showed a much higher resistance than any plates previously tested.

ARMORY may mean a storehouse for arms; but the name is also often applied to a collection of ancient armor and weapons—such as those in the Tower of London, in Sir Samuel Meyrick's mansion at Goodrich court on the Wye, and in Warwick castle.

In the United States an armory is usually a storehouse for arms used by militia companies or regiments, and often comprises a drill-hall, regimental offices, etc.

ARMS, or weapons of offense, may be divided into two great classes—those that act by means of gunpowder, and those that do not. Of arms that act otherwise than by explosion, the greater part have been in use from the earliest times; they include the bow and arrow, sling, pike, spear, lance, dart, javelin, dagger, axe, mace, spiked or knotted club, scythe for chariots, dirk, bayonet, sword, cutlass, etc., together with such artillery as the ballista, catapult, and battering-ram. Weapons depending on the use of gunpowder are of two kinds—those that can be held in the hand, and those that are too heavy to be portable. In the first class, we find the names of the hand-cannon, hand-gun, arquebus, haquebuts, demi-haque, matchlock, wheel-lock, firelock, currier, snap-haunce, caliver, esclopette, petronel, dragon, hand-mortar, dag, tricker-lock, carbine, fusil, fowlingpiece, blunderbuss, pistol, musket or musquet, musketoon, rifle, etc. In the second class, more usually included under the name of artillery, we find the springel, war-wolf, bombard, cart-of-war, culverin, demi-culverin, serpentine, falcon, saker, 'cannon, howitzer, petard, carronade, mortar, rifled cannon, war-rockets, etc. The more important of these are briefly noticed under the proper headings. It is needless, perhaps, to add that nine tenths of these are utterly obsolete.

The surveyor-gen. of the ordnance in the British army has the duty of providing and keeping efficient the arms in use by the regular and auxiliary forces, and of maintaining an ample reserve in the royal arsenals. Each regiment makes a report on these subjects yearly. If the commanding officer of a regiment ascertains that a new supply of arms is needed for the men under him, or a supply of anything in relation to the arms, he indents upon the controller of the district for the supply required; which is forthwith made by that officer, subject, however, to a pecuniary fine upon the regiment, if the arms have not lasted a fair time.

ARMS, ARMORIAL BEARINGS, or ENSIGNS, are the names given to such devices as when painted on a shield form a coat. These terms in popular speech include all the accompaniments of a shield—viz., the crest, helmet, and, where such exist, the supporters, etc. See these terms, and **HERALDRY**.

ARMS, ASSUMPTIVE. See **HERALDRY**.

ARMS, BREECH-LOADING. See **BREECH-LOADING ARMS**.

ARMS, SERGEANT AT. See **SERGEANT-AT-ARMS**.

ARMS, STAND OF, a complete set of arms for one soldier, consisting of a musket, bayonet, cartridge-box, and belt with or without a sword.

ARMSTEAD, HENRY HUGH, R.A., b. London, 1828; sculptor, among whose works are many of the allegorical groups on the Albert Memorial, London; the statues of Paul, David, and Moses, on the reredos in Westminster Abbey, etc.

ARMSTRONG, a co. in w. Pennsylvania, on both sides of Allegheny river; 615 sq. m.; pop. '90, 46,747. It has a rough and hilly surface, but good lands in the river valleys. The products are salt, iron, coal, and limestone. Two railroads border or intersect it. Co. seat, Kittaning.

ARMSTRONG, a co. in n. Texas, formed 1876. Area, 900 sq. m.; pop. '90, 944. Co. seat, Claude.

ARMSTRONG, SIR ALEXANDER, was born in Ireland and educated at Trinity College, Dublin, and the University of Edinburgh. He served in the English navy for many years, and published *A Personal Narrative of the Discovery of the Northwest Passage* (1857) and *Observations on Naval Hygiene*. He was Director-General of the Medical Department of the Navy from 1869 to 1880.

ARMSTRONG, DAVID H., b. in Nova Scotia in 1812; after filling several local offices in St. Louis was, 1877, appointed U. S. senator from Mo. as a democrat, to fill the vacancy caused by the death of Lewis V. Bogy. His term expired in 1879.

ARMSTRONG, GEORGE FRANCIS, was born in Dublin, 1845, and there educated. He has been professor of English Literature in Queen's College, Cork, and in Queen's Uni-

versity, and has published *Poems* (1869); *King Saul* (1872); *King David* (1874); *King Solomon* (1876); *A Garland from Greece* (1882); and *Mephistopheles in Broadcloth* (1888).

ARMSTRONG, GEORGE FREDERICK, was born in England in 1842, and educated at Cambridge. Developing a strong taste for mechanics, he studied engineering, and was Professor of Engineering in the School of Applied Science, McGill University, Montreal, from 1871-1876. He was then called to a similar chair in the Yorkshire College of Science, Leeds, and in 1885 became Regius Professor of Engineering in the University of Edinburgh. He is a member of many learned societies, and the author of numerous papers and addresses.

ARMSTRONG, JOHN, an eminent physician and medical writer, was b. 8th May, 1784, at Ayres Quay, near Bishop-Wearmouth, where his father was the superintendent of some glassworks. He studied medicine at the university of Edinburgh, and in June, 1808, took the degree of M.D. He commenced practice at Bishop-Wearmouth, and in 1811 was chosen physician to the infirmary at Sunderland. In 1816, he published a work on *Typhus*, which greatly extended his reputation. His researches concerning the causes and phenomena of febrile diseases having made his name well known in the metropolis, he was induced, in Feb., 1818, to remove to London, where his practice became extensive, and he was elected physician to the fever hospital. In 1821, in concert with Mr. Edward Grainger, he established a medical school in Webb street, Borough, where he lectured on the practice of physic. He also delivered a course of lectures on materia medica. In 1826, he joined Dr. Boot and Mr. E. Bennett in establishing a new school of medicine in Dean street, Soho, but shortly after relinquished his connection with it. He d. of consumption, 12th Dec., 1829, aged 45. Exclusively devoted to the duties of his profession, Dr. A. was very successful in the elucidation of medical science. His works are numerous, and he contributed various papers to the medical journals. His lectures, inserted in the *Lancet* in 1825, were published in a separate form after his death, with the following title: *Lectures on the Morbid Anatomy, Nature, and Treatment of Acute and Chronic Diseases, by the late John Armstrong, M.D. Edited by Joseph Rix—one of his pupils.* (London, 1834, 8vo.)

ARMSTRONG, JOHN, d. 1725-95; leader of the successful expedition in 1756 against the Indian allies of the French at Kittaning, Penn. In the revolutionary army he was a brig.-gen. at Fort Moultrie, and commanded the militia at Brandywine and German-ton. He served twice in the continental congress, 1778-80 and 1787-88.

ARMSTRONG, JOHN, 1758-1843; an American soldier and writer. While a student he volunteered, was soon made aide-de-camp to Gen. Mercer, and was with Gates in the Burgoyne campaign, leaving the service with the rank of major. He wrote the *Newburgh Letters*, setting forth the hardships of the revolutionary soldiers in respect to pay. He was attorney gen. of Pennsylvania; United States senator from New York, 1800-4; minister to France, 1804-10; brigadier-gen. in the war of 1812; and secretary of war, 1813-14. He was charged with inefficiency in consequence of the capture of Washington, and resigned, Sept., 1814. He published a *History of the War of 1812*, *Memoirs of Montgomery and Wayne*, a *Review of Gen. Wilkinson's Memoirs*, and partially prepared a history of the revolution.

ARMSTRONG, RICHARD, D.D., 1805-60; b. Penn. He graduated from Dickinson college in 1827, studied theology at Princeton, and in 1832 went to the Sandwich islands as a missionary. In the Hawaiian government he was minister of instruction, presided over the board of education, and acted as privy counselor.

ARMSTRONG, ROBERT, a general in the United States army during the Seminole War in Florida. He was born in Tennessee in 1790, and died at Washington, in 1854. He was an esteemed friend of President Jackson.

ARMSTRONG, SAMUEL CHAPMAN, b. 1839 in Hawaiian islands, where his father was a missionary of the Am. board, and where he began his collegiate course at Oahu coll., completing it at Williams coll., Mass. He was chief clerk of the department of public instruction in Hawaiian islands and editor of *Hae Hawaii*; was cap. and maj. 125th reg. N. Y. vols., 1862-3; lieut. col. of the 9th and col. of the 8th U. S. colored troops, 1863-5; rose to brev. brig. gen.; was superintendent of a district of 10 counties in e. Va. in the freedmen's bureau, 1866-68; and in 1868 was appointed principal of the Hampton normal and agricultural institute (q. v.). His constant endeavor was to show the best methods of educating the negro and Indian races in this country, adopting to that end a system of combined labor and study, to give them the means of self-support, develop manual skill, and promote manliness and self-reliance. His work for the neglected races produced most beneficial results. He died May 11, 1893.

ARMSTRONG, SAMUEL T. (1784-1850), a well-known bookseller of Boston, Mass., who at different times was mayor of that city, and governor of the state (1836).

ARMSTRONG, Lord WILLIAM GEORGE, noted for various mechanical inventions, especially in artillery and in water-power machinery, was b. in 1810 at Newcastle, where his father was an eminent corn-merchant, and in 1851 filled the office of mayor. A. was

educated at the school of bishop Auckland; but his peculiar mental powers were chiefly cultivated by the opportunities which his father's tastes gave him, at home, of acquainting himself with chemistry, electricity, and mechanics. Though the natural bent of his mind was to some profession in which these sciences would have been available, he readily yielded to his father's wishes, and was articled to Mr. Armourer Donkin, an eminent solicitor in Newcastle, who, at the expiration of his time, adopted him as a partner. A high sense of duty enabled A. to give his excellent general powers of mind to business; but he devoted much of his leisure to his favorite pursuits, and his inventive faculty was constantly active. About 1838, observing one day a little stream descending along a height near Newcastle, and driving but a single mill, he thought to how much more purpose it might be applied hydraulically, and thus was led into a course of experimenting, which resulted in his producing a much improved hydraulic engine, of which a description was given in the *Mechanics' Magazine* for April 18, 1840. Following up this invention with a view to practical applications, he gave to the world, in 1845, a hydraulic crane, which has proved to be of eminent utility in raising weights at harbors and in warehouses. The discovery of electricity in steam by a workman at a fixed engine on the Cramlington railway in 1840 had meanwhile led A. into a new path, and in 1842 he brought to perfection an apparatus for producing electricity from steam, which was soon after introduced into the Polytechnic Institution in London. The evolution of the electricity depending in reality on the friction sustained by the small quantity of water which accompanies the steam in its discharge, the great merit of A.'s invention in this case lay in the form he gave the orifice through which the steam passed. This and other inventions brought him into prominent notice; he was elected a member of the royal society in 1846; and, shortly afterwards, in conjunction with some friends, commenced the Elswick engine-works, in the suburbs of his native town. This establishment is upon a large scale, at first chiefly employed in producing hydraulic cranes, engines, accumulators, and bridges, for use in Great Britain, the continent, and India, but now embracing also works for the production of ordnance.

In 1854, while war was raging in the Crimea, the war office was solicited by many inventors to make trial of new forms of cannon and projectiles. Mr. Armstrong, one of the number, attracted the attention of the authorities, and was employed to make explosive apparatus for blowing up the ships sunk at Sebastopol. This led him soon afterwards to consider improvements in ordnance, and he devised a form of breech-loading cannon, combining many peculiarities in structure and action. He received encouragement to make a few field-pieces on his new method. He made lengthened experiments on the strength of iron and steel, on the relative merits of cast and wrought iron, on the best number of grooves in rifling, on the best pitch or twist for these grooves, on the most convenient modes of loading at the breech of the gun, on the mechanism for lessening the recoil, on the best form and structure of shot and shells, and on the fuses best suited for igniting the shells during their flight.

Most of the early experiments were made with guns throwing 6-lb. and 18-lb. shot and shells, and subsequently 32-lb. shells. The last-named gun was built up piecemeal, to avoid flaws or faults, and to insure strength, lightness, and durability. It was made in 3-ft. lengths. Bars of wrought iron, 2 in. wide, were heated to whiteness, twisted spirally round a steel bar or core, and welded; other bars were twisted over these in a similar way, but with an opposite turn of the spiral; a third and perhaps a fourth were added, according to the thickness and strength needed. Another heating to whiteness preceded a thorough welding of all the layers of bars by a steam-hammer. The ends of two of these 3-ft. pieces were then nicely trimmed and adjusted, placed in contact, and bound together by the enormous pressure of a wrought-iron ring shrunk on while at a white heat. By varying the number and length of these sections, a gun of any length could be made. The core was then removed, and the bore of the gun rifled by exquisite machinery. The rifle-grooves were so small and close as to be upwards of 40 in number; their pitch or twist such as to make a complete circuit in a gun 10 ft. long. The breech of the gun was wholly distinct, and constructed in a different way; it could be drawn backwards by unscrewing, and had a hole through its center for introducing the shot or shell and the charge. At first, the inventor adopted a steel interior for his gun; but afterwards relied on the toughest wrought-iron. The projectile employed with this gun might be solid shot, shell, case-shot, or canister-shot; but the shell was that to which most interest is attached. It was about 3 diameters in length; and thus a 32-lb. shot or shell could be fired from a gun of much smaller caliber than if it were spherical. The shell was built up of about 50 separate pieces of cast-iron, very accurately fitted, and enveloped in an iron sheath. Outside of it were two bands of lead, soft enough to be forced into the rifled grooves of the gun, and thus to acquire the rotatory movement by which the straightness of flight is so much insured.

The actual results obtained by a gun such as is above described are almost incredible. An ordinary long 32-pounder weighs 57 cwt.; Armstrong's 32-pounder weighs 26 cwt. The former requires 10 lb. of powder as a charge; for the latter 5 lb. will suffice. The former will send a shot or shell 3000 yards; the range of the latter exceeds 9000 yards. The fuses attached to the shells are so exquisitely adjusted that the shell can be made to burst either directly on leaving the gun, or half-way on its path, or when it strikes an object; in the last-named case, even a sack of shavings will afford the necessary concus-

sion; and yet, so close is the structure, that an uncharged shell has been fired completely through 9 ft. of solid oak, without the pieces separating. A.'s elaborate experiments were made chiefly with a 6-pounder, $1\frac{1}{4}$ in. caliber, and so light that two men could carry it (without its carriage); this small gun could reach 1500 yards with wonderful accuracy of aim, and had a range of 3000 at a certain elevation.

When A. had spent much of his time and thoughts during four years on this subject, the government, supported by the strongly expressed opinions of artillery officers of all ranks, proposed to secure the result of these experiments for the nation. A. offered to the government, without any stipulation, not only all his past inventions, but also all such as he might hereafter discover. This led to arrangements which the ministers in parliament characterized as liberal and patriotic on his part; and the terms thus suggested were accepted. An office was created for him, that of chief engineer of rifled ordnance, for seven years provisionally; and a certain amount of salary was determined on, in consideration at once of his past inventions and of his future services. He was knighted by the queen in 1858.

The peculiar connection, partaking in some degree of the nature of a partnership, between the government and the Elswick firm, underwent changes from time to time, and was brought to a close in 1863. During its continuance, guns of gradually increasing power were made on A.'s system; 3, 5, and 12 pounders; then 18, 20, 32, and 40 pounders; then rapidly increasing in caliber, until at length a 600-pounder was produced, weighing upwards of 20 tons. The coil system of construction, the adoption of a large number of rifle grooves, and the use of the beautifully formed segment shell, were continued; but A. made variations in the combination of steel and iron, and adopted muzzle-loading for many of his larger guns. Elaborate experiments made by the war office led to a conclusion that the A. breech-loader has many disadvantages for large ordnance. Notwithstanding its range, accuracy, power of working in a small space, easiness to clean, and safety to the gunners while loading, it is neither so cheap nor so simple as the muzzle-loader; it is difficult to handle, complicated, apt to get out of order, and not so useful for general purposes. The comparative cheapness has had much to do with the preference of the war office for the Woolwich gun, a muzzle-loader. A. supplies and has long supplied many foreign governments with his guns, chiefly of large caliber. The manufacture is of the highest order, effected through the medium of machine tools of exquisite construction; but the practical utility of the gun, as compared with the Whitworth, Palliser, and other kinds, is still matter of controversy.

The great reputation and commercial success of A. depend on his skill as a constructor of water-power machinery. Early in his career, in 1847, when a plan was adopted for supplying Newcastle with water, he suggested that the power derived from the descent of the water through pipes from the reservoir should be utilized for working hydraulic cranes on the quay, and for various mechanical purposes in the town; this was done with marked success. The system has rapidly grown; until, at length, the A. hydraulic machinery is largely adopted in England and abroad for raising, lowering, hauling, and other purposes in connection with railways, canals, docks, piers, harbors, lock-gates, manufactories, warehouses, etc. The fabrication of the machinery employs a very large number of hands at Elswick, where the works are carried on by a joint-stock company. A., who belongs to several scientific societies, was in 1863 elected president of the British association; he was instrumental in bringing about the appointment of the coal commission in 1866. In 1887, on the occasion of the queen's jubilee, Sir William was raised to the peerage with the title of Baron Armstrong. He has also received a number of foreign orders of knighthood.

ARMSTRONG, WILLIAM JESSUP, D.D., 1796-1846; b. N. J.; an American Presbyterian clergyman. He was pastor of the first Presbyterian church in Richmond, Va., 1824-34; afterwards secretary of the American board of commissioners for foreign missions until his death. His life and sermons have been published. He lost his life by the wreck of the steamboat *Atlantic* on Long Island sound.

ARMY. See **ARMIES, MODERN.**

ARMY ADMINISTRATION. The fiscal arrangements of the United States army are conducted by the Secretary of War, or in his absence by the Assistant Secretary through the several staff departments. The military establishment is under the orders of the General commanding the army in that which pertains to its discipline and military control. All orders and instructions relating to military operations, or affecting the military control and discipline of the army given by the President and Secretary of War, are promulgated through the General commanding the army.

The military geographical departments are established and their commanders assigned by direction of the President, and are as follows: Department of the East, Department of the Platte, Department of Dakota, Department of Missouri, Department of Texas, Department of California, of Arizona and of the Columbia. Department commanders are expected to determine controversies arising within the limits of their jurisdiction, to decide questions referred to them on appeal, and to attend to the administration of all the military affairs. Their staffs are formed of aides-de-camp, an assistant adjutant-general, an inspector, a judge advocate, a chief quartermaster, a commissary of sub-

sistence, a medical director, a chief paymaster, an engineer, an ordnance officer and an inspector of small-arms practice.

The supply, payment, and recruitment of the army, and the direction of the expenditures of the appropriations for its support, are by law intrusted to the Secretary of War, who exercises control through the bureaux of the War Department.

The Adjutant-General's Department has charge of the military correspondence, the issuing of orders, the muster and pay rolls, the returns of troop records, personal reports and the details of the field officers to superintend the recruiting service and command the recruiting dépôts. The Inspector-General's department has to inspect every branch of military affairs and report with strict impartiality all irregularities. The following are some of the subjects on which they have to report: as to the zeal and ability displayed by commanding officers; as to whether the officers are properly instructed and efficient; as to whether the number of men in the ranks at inspection corresponds with returns; as to the discipline, military appearance and behavior of troops, the nature and frequency of drills, the uniformity and fit of the clothing. The inspection of money accounts of disbursing officers and the inspection of property for condemnation, also come under this department.

The Judge Advocate's Department has charge of legal matters affecting the army. Such are courts-martial, courts of inquiry and military commissions.

The Quartermaster's Department is charged with the duty of providing the means of transportation of every character which may be needed in the movement of troops and the material of war. It has the care of barracks, quarters, and furniture, the allowance of quarters, fuel, stores, lighting, stationery, purchase and care of public animals, forage and straw, clothing, camp and garrison equipage, telegraphing, telegraph accounts, and so forth.

The Subsistence Department provides for the distribution and expenditure of the money appropriated for the subsistence of the army, and for the purchase, issue and sale of subsistence supplies. This department is authorized to provide for sale to officers and enlisted men, articles composing the ration and such other articles as may be designated by the Inspectors-General of the army.

The Pay Department has charge of the supply and distribution of funds for the payment of the army and all other financial duties pertaining to the department. Claims for travel allowance and the deposit of savings are also in charge of this department.

The Medical Department is in charge of the Surgeon-General, who performs all the administrative duties and directs the purchase and distribution of all medical and hospital supplies, supervised by the Chief Medical Purveyor.

The Hospital Corps consists of hospital-stewards, acting hospital-stewards, and privates. All hospital services in garrison and in the field are performed by its members, who are all regularly enlisted for and permanently attached to the medical department.

The Corps of Engineers' duties comprise reconnoitring and surveying for military purposes, the selection of sites and formation of plans and estimates for military defenses; the construction and repair of fortifications and their accessories of every description; the planning and superintending of defensive or offensive works of troops in the field; the examination of routes of communications for supplies and for military movements; and the construction of military roads and bridges; and also the execution of river and harbor improvements assigned to it. It collects, arranges, and preserves all correspondence, reports, memoirs, estimates, plans, drawings, deeds, titles, and models which concern or relate in anywise to the several duties above enumerated.

The Ordnance Department procures by purchase or manufacture the necessary supplies of ordnance and ordnance stores, establishes and maintains dépôts for their storage and protection, and distributes them when needed.

The Signal Bureau attends to the construction, maintenance, and operation of military-telegraph lines, with the procurement, preservation, and distribution of the Signal Service supplies, the supervision of instruction in military signaling and telegraphy.

The functions of the Signal Office included, until 1891, the preparation of weather reports and local forecasts, but in that year this duty was assigned to the Department of Agriculture. See METEOROLOGY, SIGNALS, SIGNAL SERVICE OF THE UNITED STATES.

ARMY AGENT. In the British army, a financial agent who transacts the monetary affairs of a regiment, paying the officers in behalf of the government, settling effects and credits of soldiers, etc.

ARMY ESTIMATE. The chiefs of the various branches of the war department make up an annual statement of their requirements and the amount of money necessary to carry out their plans. These are all submitted to the Secretary of War, who in his report to the President embodies the requests of his subordinates, with his own comments thereupon. The President sends the estimates to Congress and the House of Representatives draws up what is called the Army Appropriation bill, which then goes to the Senate for its action. Among the items of the appropriation bill are salaries for employees in the various offices of the war department, public buildings and grounds in Washington, furniture, repairs, rent, stationery, pay of the army, signal service, subsistence, quartermasters' supplies, barracks and quarters, transportation, shooting gal-

leries, arsenals and ordnance stores, powder, shell, cannon, fortifications, military academy, military posts, harbor and river improvements, national cemeteries, civil surveys, artificial limbs, appliances and support of destitute patients, war claims, and the erection of monuments.

ARMY REGISTER, an official publication by the secretary of war, published from the adjutant-general's office the first of each year. It contains a list of the officers of the army divided into corps to which they belong, and giving the place of birth of each officer, the state from which he was appointed, whether he entered the service from civil life or from the military academy, the date of such entry, and the rank held at the time; also the dates of the various commissions held in the permanent establishment and in the volunteer service, together with the highest assignable brevet rank. There is a list of retired officers and aides-de-camp to general officers; the officers and professors of the military academy and the first five cadets of each class. The lineal rank and the relative rank of officers is given, as well as the officers who have been commissioned for distinguished services, who have received the thanks of Congress and who have held staff appointments other than under commission, and on whom brevet rank has been conferred. The casualties during the year are given as well as military commands and posts, armories, arsenals, recruiting, engineer and ordnance dépôts. The organization and pay of the army, with the militia force of the United States, are also included, together with the students at universities, colleges and so forth and the honor graduates of the artillery school and the infantry and cavalry school.

ARMY SCHOOLS. In the U. S. Army the schools are known as post schools and the instruction of enlisted men is considered to be a military duty. Zealous and efficient officers are detailed for this duty that it may be put on a footing commensurate with its importance. At posts where there is a chaplain the instruction falls to him, and the commanding officer also gives the matter his personal attention. School-teachers when required are also detailed from the enlisted men in proportion not to exceed one to every fifteen men. Assistant adjutants-general of the department, under the direction of the department commander, have a general supervision of the schools, and make full reports annually as to condition and progress, setting forth specifically any cases of failure or neglect on the part of post commanders to take proper interest in or facilitate the operations of the schools. Inspection of the schools is also made by the officers of the Inspector-General's department, who examine into the system of instruction, and endeavor to bring about uniformity in the methods. At posts where the number of children present will admit of it, and where there are no convenient educational privileges, schools are maintained, at which the attendance of officers' children is optional, and those of enlisted men compulsory. The children of citizens living near the post are allowed to attend, and, if able, they are expected to pay a small rate therefor. Parents supply the necessary books, except in the cases of enlisted men, when the Government furnishes them.

ARMY, UNITED STATES. See UNITED STATES.

ARMY-WORM is in the northern states the larva of a noctuid moth, *heliophila unpunctata*. It grows to nearly 2 in. in length; its appearance varies with the successive moultings, as is common with caterpillars, but when grown it is dark gray marked with three yellow stripes above, and a broader one of the same color along each side. The moth is light chocolate brown, bearing a white dot in the center of each fore-wing. Two generations appear each summer; occasionally in so great numbers as to cause serious damage. Their ravages may be checked in a measure by surrounding the field where they are found by a double furrow, or a ditch, and crushing those that fall in.

The southern army or cotton worm, *aletia argillacea*, is a much more troublesome visitor. The larva is a semi-looper, yellowish green; the segments of the body are ornamented with black dots, appearing as warts under the microscope, some of them supporting hairs. In some specimens a dorsal line is visible.

ARNASON, JÓN, b. at Reykjavik in Iceland, 1819. He devoted much time to the study of the antiquities and literature of Iceland, and in 1849 became custodian of the national library at Reykjavik. He published biographical and historical works, but his fame rests chiefly on his *Iceland Popular Tales and Adventures*, 1862-64. Died in 1888.

ARNAUD, HENRI, 1641-1721; historian of the Vaudois, pastor and painter; a native of Piedmont. Encouraged by the English revolution and the enthronement of William III., and probably with pecuniary assistance from England, A. undertook to bring back to their native valleys the Vaudois expatriated by Victor Amadeus of Savoy. In Sept., 1689, he led about a thousand of the exiles into the valley of the San Martino, though opposed by a superior force; but being in danger of attack by 20,000 troops, he retired to the high table-land of the Balsille, making such fortifications as he could. Here he was assaulted, May 2, 1690, by 22,000 French, whose failure was so complete that A. lost not a man, while the French were almost decimated. A. did not risk another fight, but withdrew to Angona, and, just when final capture seemed assured, he learned that war was begun between France and Piedmont, and that the Piedmontese king had suddenly become a friend of the exiles, ready to receive them. The Vaudois were at

peace in their valleys until the war of the Spanish succession began, when A. and his men did good service against France; but when that was over, the king of Piedmont again leagued with France against them, and 3000 Vaudois were expelled, finding an asylum in Würtemberg. A. was invited to England by William III., but preferred to remain pastor among his exiled countrymen at Schönberg, where he wrote his *Histoire de la Glorieuse Rentrée des Vaudois dans leurs Vallées*, dedicated to queen Anne.

ARNAULD, ANGÉLIQUE, a daughter of Robert Arnauld d'Andilly, was b. on the 28th Nov., 1624. From her earliest years she exhibited an extraordinary force and resoluteness of character, and excited much anxious speculation concerning her future career among her relatives. When not quite twenty years of age, she became a nun at Port Royal des Champs, where she had been educated by her aunt, Marie Jaqueline Angélique Arnauld, sister of the great Arnauld. Nine years after, she was made subprioress; and on removing some years later to Port Royal de Paris, she held the same office. During the persecution of the Port Royalists, A. A., by her piety and courage, sustained the spirit of the sisterhood. The whole family, male and female, were determined Jansenists, and none more so than mother Angélique de Saint-Jean (her conventual name). She had much to endure, but she met misfortunes with earnest intrepidity. A royal order was issued to break up the nunnery. The police arrested the inmates, who were dispersed in various convents throughout France, and constant efforts were made by the Jesuits to induce them to sign the "formulary of Alexander VII." A. A. was alone exempted from listening to their arguments and solicitations, her "obstinacy" being supposed invincible. At length, by command of the archbishop of Paris, the nuns were restored to Port Royal des Champs; but for some years they were subjected to a strict surveillance by soldiers, who watched all their movements, and allowed them no intercourse with persons out of the convent. In 1669, however, was issued the edict of Clement IX. for the peace of the church, which was a kind of compromise on this vexed question of Jansenism and Jesuitism. The nuns received back the privileges of which they had been stripped, and constituted their society anew. A. A. was again elected prioress. In 1678, she was made abbess. The next year, her protectress, the Duchesse de Longueville died, and the persecution recommenced by the prohibition to receive any more novices. Still Angélique did not despair. She consoled the nuns, and exerted all her influence with persons in power, but with little effect. At last she sank under a complication of griefs, and expired on the 29th of Jan., 1684, leaving behind her as bright and beautiful a memory as any of her countrywomen. She was learned without being pedantic, pious without bigotry, and gentle to others in proportion as she was severe to herself. A. A. wrote several works, the most valuable of which is *Mémoires pour servir à la Vie de la Mère Marie Angélique Arnauld de Sainte Madeleine, Réformatrice de Port Royal*. See Martin, *Angélique Arnauld* (1876).

ARNAULD, ANTOINE, the greatest advocate of his time in France, was b. at Paris in 1560. He was descended from an ancient family of Auvergne, which had distinguished itself both in civil and military affairs. A. was not less remarkable for his eloquence than for his probity. His zealous defense of the university of Paris against the Jesuits in 1594 won for him a wide celebrity. It was reprinted in 1717. He published another work against the society of Jesus, and several tractates of an earnest political character. The Jesuits accused him of being a Huguenot, but the accusation was unfounded, for he had no personal predilection in favor of Protestantism as a distinct religious system. He had several children, who formed the nucleus of the Jansenists and Port-Royalists. He d. 29th Dec., 1619.

ARNAULD, ANTOINE, known as "the great A.," the twentieth and youngest son of the preceding, was b. at Paris, Feb. 6, 1612. Although originally intended for the bar, he could not conceal his dislike of the legal profession, and was in consequence dedicated by his mother to the service of the church. Entering the Sorbonne, he became a pupil of Lescot, the confessor of Cardinal Richelieu, and afterwards bishop of Chartres. Lescot initiated him into the scholastic theology; but his attention having been drawn to the writings of Augustine, he soon conceived an admiration for that profoundest of the early Christian thinkers which he ever after retained. It was Augustine, he himself admitted, who first showed him the great difference between the two states—that of a nature whole and sound, and that of a nature corrupted by sin. In 1641, the Sorbonne wished to receive him into their society, on account of his extraordinary piety and talents, but Cardinal Richelieu opposed this. In the following year he was ordained a priest, and in 1643 he published a work entitled *De la Fréquente Communion*, which was received in the most favorable manner by all except the Jesuits, who had taken alarm at the virtues of A., and were already attempting to defame one whom they instinctively felt to be a reproach to their order. As a consequence of this publication, he was now admitted "of the society" of the Sorbonne. A. not only replied to the aspersions of the Jesuits in his *avertissement*, but also sent forth a work which was the prelude to a long and fierce contest with his adversaries, *Théologie Morale des Jésuites* (Moral Theology of the Jesuits). But the hatred of the latter was not confined to literary libels; they advised the chancellor of the Sorbonne to carry the dispute to Rome, whither A. would be obliged to follow and defend himself. In this scheme, however, they were defeated.

A. now buried himself in seclusion for 21 years, during which period, however, his

pen was almost continuously active. In 1644 appeared his *Tradition de l'Eglise sur la Pénitence* (Opinion of the Church on the Doctrine of Penitence). It was a reply to the attacks which the Jesuits had made against his *Frequent Communion*. A. was still entangled in the disputes which arose out of this treatise, when he became involved in another controversy that colored the whole of his subsequent career, and may be said to have won for him his position in history. This was the great Jansenist controversy. In 1640 had appeared a posthumous work of Jansenius, bishop of Ypres, entitled *Augustinus; seu Doctrina Sancti Augustini de Humanæ Naturæ Sanctitate, Aegritudine Medicinâ, adversus Pelagianos et Massilienses*. It laid down with a rigor equal to that of Calvin the doctrines of predestination, the corruption of human nature, and the depravity of the will. It was specially intended as a counteractive against the lax principles and morality of the Jesuits, many of whom, and especially their great champion, Molina, entertained extreme Pelagian views of the freedom of the human will, which they had cunningly interwoven into their "scarlet-colored" web of ethics. The work, in the meantime, was condemned by Pope Urban VIII., on the 1st of Aug. 1641. A., who quickly apprehended its vital importance in the existing state of things, boldly ventured to defend it against the censures of the papal bull. He published several pamphlets, closing with a first and second *Apologie de Jansénius*. It is to the honor of the religion of A., however, that it was not always controversial. Whenever a moment of armistice was permitted him, he occupied it in writing such works as *Mœurs de l'Eglise Catholique*, *La Correction*, *La Grâce*, *La Vérité de la Religion*, *De la Foi*, *de l'Espérance*, *et de la Charité*, and the *Manuel de Saint Augustine*. He also varied these occupations by translating into Latin his *Frequent Communion*, and by the composition of his *Novæ Objectiones contra Renat, Descartis Meditationes*, and several smaller tractates. In addition to his literary labors, he undertook the direction of the nuns of Port Royal des Champs, a convent of which his sister, Marie Jaqueline Angélique Arnauld, was abbess. In this retreat he was surrounded by many friends, thirsting like himself for the quiet pleasures of study, some of whom have left their mark in the world, such as Pascal, Nicole, etc. Here they wrote in common numerous excellent works. A. executed parts of the *Grammaire Générale Raisonnée*, *Eléments de Géométrie*, and *L'Art de Penser*. In 1649, the Jansenist controversy broke out more fiercely than ever. The *Augustinus* of the bishop of Ypres was again attacked and condemned by the Sorbonne and the pope. A. replied in his *Considérations*. In 1650 appeared what he conceived to be his best work, *L'Apologie pour les Saints Pères*. For the next half-dozen years he was engaged in constant and painful disputes; yet, in spite of the polemical character of his life, the impression of his piety and earnestness was deepened in the mind of the nation; and on reading some of his compositions, even Alexander VII. is reported to have praised the author, and to have exhorted him for the future to despise the libels of his adversaries. During the strife he published *La Concorde des Evangiles* and *L'Office du Saint-Sacrement*. In 1655-56, for prudential reasons, he left his retreat at Port-Royal; about the same time he was expelled from the sorbonne and the faculty of theology.

In 1656, the war with the Jesuits was renewed—not, however, by A. in person. An unknown knight with closed visor had ridden into the lists—the great Pascal. Under the *nom de plume* of Louis de Montalto, he discharged his scorpion wit against the Jesuits for about a year and a half in the *Provincial Letters*. A. furnished him with materials; but, in 1658, he took the field *in propria personâ*, by publishing his *Cinq Ecrits en faveur des Curés de Paris contre les Casuistes relâchés*. In 1662 appeared *La Nouvelle Hérésie* (of the Jesuits); in 1669, the first volume of his *Morale Pratique* (of the Jesuits), the last of which was not published until the year of his death.

A., who was a sincere Catholic after his fashion, next had a theological controversy, properly so called, with the reformed minister Claude, the consequence of which was his volume *Du Renversement de la Morale de J. C. par la Doctrine des Calvinistes touchant la Justification* (1672). In 1675, he returned to the subject in his *Impiété de la Morale des Calvinistes*. Some years previous to this, A. had enjoyed the peace of Clement IX., which put a stop for the time to the Jansenist controversy. He had been presented to the papal nuncio and to the *grand monarque*, both of whom flattered him highly; but the Jesuits, who could not breathe freely in his presence, used their utmost efforts to prejudice Louis against him, and at last the king issued an order for his arrest. A. hid himself for some time, but finally withdrew into Belgium. He felt his exile keenly, though honored by many learned and influential persons, and could not rest in one city, but wandered from place to place, ever displaying the same astonishing vigor of mind and the same polemical tendency. It is strange that this man, who was celebrated amongst his friends for equanimity and gentleness of heart, should have been so bitter in his controversies, even with his friends, for he wrote not against his enemies only, but against Pascal, Domat, Nicole, his protector, Pope Innocent XI., and his old friend Père Malebranche. So earnest was he for the truth—which earnestness had no doubt been greatly intensified by persecution and controversy—that he could never thoroughly realize the idea that there might be truth on the other side also. He d. at Brussels, 8th Aug., 1694. His works, which amount to upwards of 100 volumes, were published at Paris, 1775-83.

ARNAULD, HENRI, 1597-1694; bishop of Angers. He abandoned the bar for the pulpit, and in 1645 was mediator between Innocent X. and the Barberini (a powerful

family, one of whom was a cardinal), and for his success a medal was made and a statue set up in his honor. In 1649, he was made bishop, and became a strong Jansenist, being one of the prelates who refused to sign an acceptance of the bull against that heresy. He was remarkable for close attention to duty, limiting his sleep to five hours. His *Negotiations at the Court of Rome* furnishes five volumes of curious information and gossip.

ARNAULD, JACQUELINE MARIE (usually called by her name in religion, **MARIE ANGÉLIQUE DE SAINTE MAGDELEINE**), b. 1591; second daughter of the celebrated advocate, Antoine Arnauld. In her 9th year she assumed the dress of a novice; and, concealing her age, her father induced the pope to nominate her abbess of Port Royal when she was a little over 11 years old. At first she disliked her situation, but a sermon in 1608 fully converted her, and she passed at once to the severest convent discipline. She speedily became famous for piety, and when Madame d'Estrees, abbess of Maubisson, was removed for gross misconduct, Angélique received charge of the convent. In 1623, she returned to Port Royal, and three years later the community removed to the house known as Port Royal de Paris, where she fulfilled a long cherished desire in resigning her dignity of abbess. She was afterwards superior of a new religious community in Paris; then prioress at Port Royal, where her sister Agnes was abbess; and in 1648, she, with a few companions, did much kindness to the poor who were oppressed by the civil wars. She d. in 1661, just before the storm of persecution reached her home.

ARNAULD, ROBERT D'ANDILLY, the eldest son of Antoine Arnauld, the advocate, and brother of the great Arnauld, was b. at Paris in 1588. He was a person of considerable consequence at the French court, where his influence was ever exerted beneficially. Balzac spoke very highly of him. At the age of 55 he quitted the bustle of the world for the solitude of Port-Royal des Champs, where he devoted himself to religious history and biography. His chief works are translations, such as those of the *Confessions of St. Augustine*, and of the *History of the Jews*, by Josephus. The latter work is esteemed more elegant than accurate, however. In 1668 appeared his translation of the *Lives of the Holy Fathers of the Desert, and of several Saints*; and in 1670, that of the works of St. Theresa. He was likewise the author of some pieces of religious verse. He d. 27th Sept., 1674.

ARNAULT, VINCENT ANTOINE, 1766-1834; a French dramatic author. In 1797, the first council sent him to the Ionian islands on diplomatic business, and for a time he lived in Venice. That city suggested *Les Vénitiens*, produced in 1799, and favorably received, particularly by Napoleon, before whom A. gave lectures on the old city of the doges. He was advanced by Napoleon to offices in the academy and the university. Besides his early tragedies, *Marius à Minturnes*, *Lucrece*, and *Les Vénitiens*, he wrote works in prose, poems, fables, and *Vie Politique et Militaire de Napoléon*, and assisted in the *Nouvelle Biographie des Contemporaines*.

ARND, or ARNDT, JOHANN, a German Protestant divine, b. at Ballenstadt, in Anhalt, in 1555, became Lutheran pastor at Quedlinburg, Brunswick, and elsewhere, and d. at Celle, Hanover, in 1621. As a man he was remarkable for his piety and active benevolence; but he is chiefly known for a work entitled *True Christianity* (*Wahres Christenthum*), which was translated into most European languages, and is yet popular in Germany. Its object is "edification"—the promotion of practical religion; and it is written with great warmth and unction, and in a strain of piety bordering on mysticism. It has been called the Protestant à Kempis, and its author the Fenelon of the Protestant church. There is an English translation by W. Jaques (Lond., 1815, 2 vols.).

ARNDT, ERNST MORITZ, professor in the university of Bonn, and for half a century one of the leading political writers of Germany, was b. in the island of Rügen in 1769. He gave up the clerical profession, for which he was at first intended, and, after traveling over a great part of Europe, became, in 1806, professor of history in Greifswald. Here, among other writings, he published his *History of Serfdom in Pomerania*, for which he was formally denounced and accused by several nobles. In his *Spirit of the Times* (Altenb., 1807), he attacked Napoleon with such boldness, that, after the battle of Jena, he had to take refuge in Stockholm. Returning under a feigned name, he resumed his functions at Greifswald in 1810; but war becoming imminent, he resigned the following year, and became an active co-operator with the minister Von Stein, and other patriots, in throwing off the foreign yoke. His numerous fugitive writings, full of energy and fire, contributed not a little to rouse and sustain the spirit of Germany for the war of liberation. His best poems belong to this period, and several of them have become national songs. (A new selection, Leip., 1850.) His song, *What is the German Fatherland?* is sung wherever German is spoken. In 1818, he was made professor of modern history in the new university of Bonn, but became involved in 1819 in the prosecutions for what were called "demagogic movements," and was suspended. Though acquitted on trial, he was made to retire, retaining his salary. After twenty years' suspension, he was restored in 1840. His writings are numerous: we may mention his *Beschreibung und Geschichte der Schottländ. Inseln*, etc. (Leip., 1826); a collection of his fugitive *Schriften für und an meine lieben Deutschen* (3 vols., Leip., 1845); and *Erinnerungen aus*

dem äussern Leben (3d ed., Leip., 1842). He was elected a member of the German national assembly in 1848, but seceded from it along with the whole Gagern (q.v) party in 1849. He powerfully supported the party who advocated a constitutional hereditary monarchy, and took a prominent part in the appointment of the archduke John as regent, and in the fruitless deputation to Berlin to offer the empire to the king of Prussia. After the dissolution of the Frankfort assembly, A. did not cease in his fugitive writings to advocate the views of the German national party. He d. 29th Jan., 1860.

ARNDTS VON ARNSBERG, KARL LUDWIG, 1803-78 ; b. Arnsberg, Prussia ; prof. of jurisprudence in Bonn, Munich, and Vienna universities, and a noted writer on the same subject. He favored warmly Austria's claims for admission to the German empire, and used his influence to that end in 1848, when in the national assembly. He was knighted by Austria in 1871. His best-known works are the *Lehrbuch der Pandekten* and the *Juristische Encyclopädie und Methodologie*.

ARNE, THOMAS AUGUSTINE, doctor in music, one of the best and most genial of English composers, was b. in London, 1710, and received his early education at Eton. His father, who was an upholsterer, intended to educate him for the bar ; but the love of music was too strong to be restrained. Young A. became skillful as a violin-player, forming his style chiefly on the model of Corelli ; and his zeal in the study of music induced his sister (afterwards celebrated as Mrs. Cibber) to cultivate her excellent voice. He wrote for her a part in his first opera, *Rosamond*, which was first performed with great success in 1733. Next followed his comic operetta, *Tom Thumb, or the Opera of Operas* ; and afterwards his *Comus* (1738), which displayed greater cultivation of style. He married a singer, Cecilia Young (1740) ; and after a successful visit to Ireland, was engaged as composer to Drury Lane theatre, and wrote many vocal pieces for the Vauxhall concerts. The national air, *Rule Britannia*, which was originally given in a popular performance, *The Masque of Alfred*, was of his composition. He composed also two oratorios, *Akel* and *Judith*, a number of operas, including *Comus*, on Milton's text, 1738, and *Artaxerxes*, in the Italian style, 1762. His genius was better adapted to simple pastoral melody than to great dramatic compositions, and he wrote many glees, catches, canons, and songs, and music to Garrick's *Ode to Shakspeare* for the Jubilee at Stratford-on-Avon in 1769. His son, Michael, 1741-'86, was also a composer. He d. in London, 1778.

ARN'HEIM, or ARNHEM, the Roman Arenacum, capital of the province of Guelderland, in Holland, with a pop. of (95) 54,180, is situated on the right bank of the Rhine, which is here crossed by a bridge of boats. It has a considerable transit-trade between Amsterdam and Germany. The environs of this strongly fortified town are exceedingly picturesque. Among its most remarkable buildings are the Reformed Dutch church, which contains monuments of the dukes of Guelderland ; and the town-house, noted for the grotesque adornment of its front, which has gained it the name of Duivelshuis. There are several paper-mills in the neighborhood. Here Sir Philip Sidney d. in 1586, after the battle of Zutphen. In 1813, A. was taken by storm by the Prussians, under Gen. Bulow, and the way thus prepared for the occupation of Holland.

ARNHEM. See ARNHEIM.

ARNICA, a genus of plants belonging to the natural order *compositæ*, sub-order *corymbifera*. The flowers of the ray are female and ligulate, those of the disk hermaphrodite and tubular. The receptacle is naked ; the pappus hairy. The root, leaves, and flowers of the mountain A. (*A. montana*), sometimes called mountain tobacco, are much valued in medicine, and administered in various forms as a stimulant in paralytic affections, typhoid fevers, and other diseases. They are also applied with much benefit to bruises, to promote the re-absorption of extravasated blood. They contain a peculiar volatile oil, a resin, an extractive matter, and an alkaloid (*arnicina*). The root is perennial and crooked, the stem about 2 ft. high, simple or little branched, with few leaves, bearing on the summit a head of flowers of a dark golden yellow, often 2 in. in breadth. It flowers from June to Aug., forms an ornament of mountain meadows in Germany and Switzerland, and is found upon the continent as far s. as Portugal, and as far n. as Lapland. This word is probably a corruption of *ptarmica*.

ARNIGIO, BARTOLOMEO, an Italian poet who was born at Brescia, in 1523, and died there of the plague in 1577.

ARNIM, ELIZABETH VON, better known as Bettina, wife of Ludwig Achim von Arnim (q.v.), was b. in 1785, at Frankfort-on-the-Maine. From her childhood excitable and eccentric, an early and profound impression was made upon her mind by the suicide of her friend, the canoness von Gunderode. The next great event of her life was her devoted attachment to, and intimacy with, Goethe, at that time a man of nearly 60. Their correspondence, entitled *Goethe's Letters to a Child*, was published in 1835, and translated by Bettina into English. Her letters are poetical, graceful, and fascinating, though often careless and extravagant, and abound in graphic sketches of men of the time. Goethe turned many of these letters into verse. Bettina's later works were semi-political in their character, and, like her earlier, full of fantastic beauty. She lived to a good old age, dying in 1859.

ARNIM, GISELA VON, a German authoress, daughter of Bettina von A. and wife of Hermann Grimm. She is known by her dramatic works.

ARNIM, HARRY, GRAF VON, a German statesman, born at Moitzelsitz, 1824, ambassador to Rome in 1864, and to France in 1872. An opponent of Bismarck's policy, he incurred the hostility of the government, and was sentenced to imprisonment on the charge of stealing and publishing state documents. He was further sentenced in 1876 on a charge of *lesa majestas*, but remained outside of the empire and escaped imprisonment. He died at Nice in 1881.

ARNIM, KARL OTTO LUDWIG VON, a well-known writer of travels and other works, was b. at Berlin, 1779. After studying at Halle and Göttingen, he traveled at different times over the most of Europe, and was employed on the embassies at Stockholm and London. His *Flüchtige Bemerkungen eines flüchtigen Reisenden* (Passing Remarks by a Passing Traveler, 6 vols., Berl., 1837-50) is recommended for its clear, elegant style, as contrasted with the lumbering and involved writing of the "academic" school. A. also wrote in English *Napoleon's Conduct towards Prussia* (Lond., 1814), and published *German National Melodies*, with German and English text (Lond., 1816). He was the author of a play and several poems. He d. in 1861.

ARNIM, LUDWIG ACHIM VON, a fantastic but original German writer of romances, was b. in Berlin, Jan. 26, 1781. After devoting some years to the study of the physical sciences, he began his career as an imaginative author with *Ariel's Revelations*, a romance which, though based on the principles of the new poetic school which had then risen in Germany, indicated, nevertheless, that the author could strike out a way of his own. His travels through Germany afforded him an opportunity of catching the peculiarities of popular life in its various provincial manifestations. He was especially interested in the old popular poetry, and stirred up among his countrymen a warmer sympathy for it by the publication, along with Clemens Brentano, of *The Boy's Wonderhorn* (Heidelberg, 1806-8). In 1809 appeared the *Winter Garden*, a collection of novels; in 1810, the romance entitled *The Poverty, Riches, Guilt, and Repentance of the Countess Dolores*; in 1811, *Halle and Jerusalem, the Sports of a Student, and the Adventures of a Pilgrim*, in which last his humor took a very saucy turn. In 1817, he published the *Crown Guardians*, a work characterized by its originality, richness of fancy, and vivid portraiture. The later years of his life were spent partly in Berlin and partly at his estate near Dahme, where he d. Jan. 21, 1831.

ARNIM, or **ARNHEIM**, JOHANN GEORG, Baron von, 1586-1641; a diplomat and general in the thirty years' war. He was in the Swedish army under Gustavus Adolphus, but, though a Protestant, Wallenstein, in 1626, induced him to join the imperial side, and to become his close friend and ally. After Wallenstein's dismissal, A. went over to the elector of Saxony, and led the left wing of the Saxon and Swedish armies in the battle of Leipsic. Upon Wallenstein's restoration, in 1632, the old friends were opponents in the field; but as little was done by either, they were suspected of playing into each other's hands. Wallenstein was assassinated in 1634, and A. began active operations, gaining a great victory at Liegnitz; but after the peace, not deeming himself properly honored by the elector, he retired to his castle, where he was taken by the Swedes and imprisoned in Stockholm. He escaped, but died very suddenly while raising an army to revenge his wrongs.

ARNO, next to the Tiber the most considerable river of central Italy, rises on Mt. Falterona, an offset of the Apennines, at an elevation of 4444 ft. above the level of the sea, and 25 m. n. of Arezzo. It flows through the deep and fertile valley of Casentino, in a s.e. direction; enters the richly cultivated plain of Arezzo, where it receives the water of the Chiana; then flows in a n.w. and n. course through the upper valley of the A. (*Valdarno*), one of the most delicious parts of Tuscany; afterwards it receives the Sieve, its largest tributary, and turns its course toward the w., flowing past Florence, Empoli, and through the t. of Pisa. The whole length of its course is about 140 miles. In old times, the embouchure of the A. was at Pisa; now it is about 4 or 5 m. distant, in lat. 43° 41' n., and long. 10° 15' e. It is navigable for barges as far up as Florence, but in the summer season even this frequently becomes impossible.

ARNOBIUS, called **AFER**, and sometimes "the elder," an early Christian writer, about the first part of the 4th c., a native of Numidia, in Africa. He was a teacher of rhetoric, and at first an opponent of the Christians, but was converted in his early years. His fame rests chiefly upon his great treatise in seven books entitled *Adversus Gentes*, in which he answers the complaint against the Christians, that the calamities and disasters of the time were due to their impiety, and had come upon men since the establishment of the Christian religion. A.'s views were tinged with gnosticism and dualism.

ARNOLD, or **ARNALD**, OF BRESCIA was a native of that t., and was distinguished by the success with which he contended against the corruptions of the clergy in the early part of the 12th century. He was educated in France under Abelard, and adopted the monastic life. By his preaching, the people of his native place were exasperated against their bishop, and the fermentation and insurrectionary spirit spread over a great part of the country, when he was cited before the second Lateran council, and banished from Italy. He retired to France, but experienced the bitter hostility of St. Bernard, who

denounced him as a violent enemy to the church. He thereupon took refuge in Zurich, where he settled for several years. Meanwhile his doctrines exerted a powerful influence in Rome, which ended in a general insurrection against the government, whereupon A. repaired thither, and endeavored to lead and direct the movement. He exhorted the people to organize a government similar to the ancient Roman republic, with its consuls, tribunes, and equestrian order. But they, provoked by the treachery and opposition of the papal party, and disunited among themselves, gave way to the grossest excesses. The city, indeed, continued for 10 years in a state of agitation and disorder. Lucius II. was killed by the populace in an insurrection in 1145, and Eugenius III., to escape a similar fate, fled into France. These violent struggles were subdued by pope Hadrian IV., who, feeling the weakness of his temporal authority, turned to the spiritual, and resorted to the extreme measure of laying the city under excommunication, when A., whose party became discouraged and fell to pieces, took refuge with certain influential friends in Campania. On the arrival of the emperor, Frederick I., for his coronation, in 1155, A. was arrested, brought to Rome, tried, hanged, his body burned, and the ashes thrown into the Tiber.

ARNOLD, BENEDICT, known in the annals of the American revolution as "the traitor," was descended from a prominent Rhode Island family, and was born in Norwich, Conn., Jan. 14, 1741. He received a fair education, but being ambitious and reckless, twice left his home and joined the provincial troops on the northern frontier. In 1762 he established himself at New Haven, as bookseller and druggist, embarked in the West India trade, prospered, and in 1767 married Margaret Mansfield, a lady of good family, who died in 1775. On receipt (Apr. 20, 1775) of the news of the battle of Lexington, Arnold led a military company to Cambridge, and proposed an expedition to capture Ticonderoga and Crown Point, and was commissioned as colonel to raise troops in western Massachusetts, but was obliged to join as a volunteer, the expedition under Ethan Allen, already on the way thither. Prevented by the Connecticut authorities from taking command of Ticonderoga after its capture, he armed a vessel and with a few troops took St. Johns, together with a royal sloop and several bateaux. Jealous persons in Connecticut prompted the Continental Congress to question his capacity and conduct, and while planning the capture of Canada, he was superseded, but was selected by Washington to head an expedition against Quebec. Late in 1775 he led 1100 men through the forests of Maine, enduring great hardships, and on Dec. 3 was joined by General Montgomery. In the daring but unsuccessful assault, Dec. 31, in which Montgomery fell, Arnold broke his leg, but recovering, took command at Montreal, Congress having made him brigadier-general. In June, 1776, he retreated by way of Lake Champlain, and was immediately selected to construct and command a fleet to control that important body of water. In Oct., at Valcour bay, he attacked a British fleet twice the size of his own; held his position till night and then, aided by the darkness, stole with his crippled flotilla between the enemy's lines and escaped.

In spite of Washington's confidence in Arnold, the latter's enemies influenced Congress, and in 1777 five of his inferiors in rank were made major-generals, a slight which his sensitive and ambitious nature could not forgive, yet at Washington's request he did not resign. The British having invaded Connecticut, he joined the militia raised to repel them, and at the battle of Ridgefield showed remarkable courage, barely escaping death. Congress now elected him a major-general, but still denied him his proper rank. He co-operated with Washington in opposing the advance of Howe toward Philadelphia, and was appointed to act with General Schuyler in checking the progress of Burgoyne through eastern New York. He raised the siege of Fort Schuyler (Stanwix), and at the battle of Bemis' Heights, Sept. 19, 1777, was recklessly prominent, but General Gates, who by intrigue had superseded Schuyler, became jealous of Arnold; a quarrel ensued, and Arnold was deprived of his command. When the second battle of Saratoga occurred (Oct. 7), Arnold defied the efforts of Gates to keep him in the background, and rushing into the fight, was among the foremost leaders in the final assault which resulted in the capture of Burgoyne's army. A wound in the leg, received on that occasion, laid him up in the hospital at Albany for several months, and during that time Congress grudgingly gave him the rank he had so long claimed. In May, 1778, he joined the camp at Valley Forge, but being unfit for active service, was placed in command of Philadelphia after the British retired. Here he married, Apr., 1779, Peggy (Margaret) Shippen, a beautiful and cultivated woman, youngest daughter of Edward Shippen, a loyalist, and afterward chief-justice of the state. Moving in fashionable society and living extravagantly, Arnold naturally incurred criticism, and to this the executive council of Pennsylvania added definite charges of arbitrary exercise of military authority and of favoritism to tories. At his request a court-martial was appointed, but nearly a year elapsed before it was held (Jan., 1780), when he defended himself without counsel and was acquitted of intentional wrongdoing, but was sentenced to be reprimanded by Washington, who, while rebuking Arnold, urged him to regain the esteem of his countrymen; but this disgrace, added to the injustice of Congress and the feeling that his sacrifices of health and property were unappreciated, led Arnold to reconsider the overtures of treason made some months, if not years, before. In Aug., 1780, he took command of West Point, which through a correspondence with Major André (q.v.) he offered to

surrender to the British, and to consummate the plan, Arnold and André met at midnight on the shore of the Hudson (Sept. 21); but the capture of André Sept. 23, frustrated the scheme, and Arnold fled to the British sloop of war, *Vulture*, sending back a letter to Washington, in which he declared that love of country had actuated him. In a letter to Clinton he assumed the responsibility of André's act, and, according to a report current in the British army, even offered to give himself up to save André's life. In an address "To the Inhabitants of America," issued soon after, Arnold tried to justify himself by declaring that, considering the exhausted state of the country and the willingness of Great Britain to grant redress, war was no longer excusable, and that the alliance with France was both useless and dangerous, adding that he had determined to surrender his arms and command for a purpose "as grateful as it would have been beneficial" to his country; and that he was "only solicitous to accomplish an event of decisive importance, and to prevent as much as possible, in the execution of it, the effusion of blood." In an appeal to the continental army, he implored its members not to be the dupes of Congress or of France, but to desert, and join the corps of cavalry and infantry he was about to raise. Having been made a brigadier-general in the British army, Arnold in Dec. headed a naval expedition against Virginia, but did little besides destroying property along the James river, and burning Richmond. In 1781 he led another expedition against Connecticut, which resulted in the burning of New London and the massacre of the surrendered garrison of Fort Griswold. In Dec. 1781 he sailed for England with his family, who were pensioned by the government. He himself received £6315 (about \$31,575) for his alleged losses in joining the British, was kindly treated by the royal family, and at the king's request prepared a plan for reconciling the colonies; but received either neglect or abuse from the political parties, and failing to get a position in the army, was forced to take up his old trade of merchant. The years 1787-91 were chiefly spent at St. Johns, New Brunswick, where he carried on trade with the West Indies, but he returned with his family to London in the summer of 1791. On the breaking out of the war between England and France he was exposed to great risks in prosecuting his West India trade, and on one occasion was captured by a French ship, but escaped with his customary daring. The government still refusing to give him active service in the army, he strove by fitting out privateers against France to recover his lost fortune, but unsuccessful, weighed down by debt, and despised by two continents, he sank into a state of melancholy, and died, June 14, 1801, regretting, tradition says, his treason.

His wife, who appears to have been guiltless of any complicity in his treason, and who had great strength of character, died in 1804. By his first wife Arnold had three sons, and by his second wife, several children. His eldest sons received commissions in the British army, and the second, James Robertson, who inherited his father's daring and military ability, rose to be a lieutenant-general, was made aide-de-camp to King William IV., and was created a knight. Others of Arnold's children held honorable positions, and one of his grandsons, Captain William Traill Arnold, a brave fighter, was killed in the Crimean war. See lives by Sparks and by Isaac N. Arnold (Chicago, 1880).

ARNOLD, EDWIN, Sir, an English author, b. 1832. He taught school in Birmingham, and was president of a Sanskrit college in India, resigning in 1860. His work has been chiefly in periodical literature, though he has produced *Griselda*, a drama; *Poems, Narrative and Lyrical*; *Education in India*; a translation of the *Euterpe* of Herodotus; and a metrical translation of *The Hitopadesa*, from the Sanskrit. After his return to England he published a *History of Lord Dalhousie's Administration*, and another volume of poems. He was a correspondent of the *London Telegraph* during the civil conflict in the United States, sympathizing entirely with the northern states, and predicting their triumph. At the death of Thornton Hunt he became chief editor of the *Telegraph*. While at this exacting work he found time to translate a volume of Grecian poems, and to produce his most remarkable work, *The Light of Asia*, a production notable for its exquisite poetry and lofty philosophy, and the vividness and reality with which the scenery, climate, manners, and people of Hindustan, as they were 2000 years ago, have been portrayed. Its full title is *The Light of Asia; or, The Great Renunciation; being the Life and Teachings of Gautama (as told in verse by an Indian Buddhist)*. He has since published *Pearls of the Faith* (1882); *Indian Idylls* (1883); *The Secret of Death* (1885); *Poems, National and Oriental* (1888); *The Light of the World* (1891); *The Tenth Muse and Other Poems* (1895); *East and West* (1896), and other works. He was made a companion of the Star of India in 1877; a Knight Commander of the Indian Empire in 1888, and has been decorated by the Sultan of Turkey and other Oriental rulers. He read in the U. S. in 1891.

ARNOLD, JOHANN, a miller of Neumark, who lived in the time of Frederick II. of Prussia, and gave rise to a remarkable legal process. He complained to the king that his landlord, by making a pond, had taken away water from the mill; that he (A.) had therefore refused to pay rent for the mill, of which he held a lease; but had been condemned to pay by the unanimous decisions of two legal courts. The king took up the case, and regarding it as an oppression of the poor, reversed the decisions of the courts, dismissed his high-chancellor, imprisoned several other officers of justice, and gave orders that restitution should be made to the miller. Soon afterwards, the king died, and under Frederick William II., the case was more coolly investigated; the condemned persons were exonerated, and the miller was recompensed by the state.

ARNOLD, JONATHAN, 1741-98; an American surgeon in the revolution. He was a member of the first colonial assembly of Rhode Island; served medically in the patriot army; and was a member of the continental congress, in 1782-84.

ARNOLD, MATTHEW, a noted English poet, the eldest son of the late Dr. Arnold, of Rugby, was b. 24th Dec., 1822, and educated at Winchester and Rugby. In 1840 he was elected scholar of Balliol college, Oxford; in 1844 he obtained the Newdigate prize; and in 1845 he was elected a fellow of Oriel college. In 1851 he was appointed one of her majesty's inspectors of British schools. From 1857 to 1867 he was professor of poetry at Oxford; in 1859-60 was sent to the continent by the English government as assistant to the commissioners appointed to inquire into the state of education in France, Germany, and Holland. In 1865 he again visited the continent on a like mission. A. held the honorary degrees of Edinburgh and Oxford, and an Italian order.

Mr. A. was first known as a poet of classic taste and exquisite purity of imagination, but in his later years he almost exclusively betook himself to prose. His chief productions in verse are, *Poems* (1853), containing, among other fine pieces, *Sohrab and Rustum*, *Tristram and Yseult*, *Balder*, and *Merope* (1858), an attempt to naturalize in English literature the form of the Greek drama; *New Poems* (1867), and a corrected version (3 vols., 1885). His prose writings are very numerous. Among his prose works are his lectures on *Translating Homer* (1861); *Report on Education in France, Germany, and Holland* (1861); *A French Eton or Middle-class Education and the State* (1864); *Essays on Criticism* (1865); *Lectures on the Study of Celtic Literature* (1867); *Schools and Universities of the Continent* (1868); *Culture and Anarchy, an Essay in Political and Social Criticism* (1869); and *Higher Schools and Universities in Germany* (1874). In *St. Paul and Protestantism* (1870), and still more in *Literature and Dogma* (1872), he startled the public by his piercing and audacious application of literary criticism to religion. Among his later works were *God and the Bible* (1875); *Last Essays on Church and Religion* (1877); *Mixed Essays* (1879); *Irish Essays, and Others* (1882); *Isaiah of Jerusalem* (1883); *Discourses in America* (1885); *General Grant, an Estimate* (1887); *Civilization in the United States* (1888). Two volumes of his letters were published in 1895.

In Oct., 1883, he visited this country as a lecturer, remaining with us until March, 1884. His lectures were on "Emerson," "Numbers," and "Literature and Science." The latter two were received with comparative calmness, in spite of the fact that the lecture on "Numbers attacked" our favorite doctrine of the rule of majorities; but the lecture on "Emerson," refusing him the title of a great poet, a great writer, or a great philosopher, caused great commotion in literary circles in New England, and provoked indignant replies. He died, April 16, 1888.

ARNOLD, SAMUEL, 1740-1802; an English composer; educated under Dr. Nares in the Chapel Royal, and at 20 years of age appointed composer at Covent Garden theatre. Here, in 1765, he produced *the Maid of the Mill*. In 1776 he became composer to the Haymarket; in 1783 was appointed composer to the king, and ten years afterwards organist in Westminster Abbey, where he was buried. Among his works are *Inkle and Yarico*, *Rosamond*, *The Battle of Hexham*, *The Mountaineers*; and in sacred music, *The Cure of Saul*, *The Prodigal Son*, *Abimelech*, and *The Resurrection*.

ARNOLD, THOMAS, D.D., head-master of Rugby school, and the author of a *History of Rome*, was b. June 13, 1795, at west Cowes, in the Isle of Wight. In 1803 he was sent to Warminster school, in Wiltshire, but was removed in 1807 to the public school of Winchester, where he remained till 1811, when he was elected a scholar of Corpus Christi college, Oxford. In 1815 he was elected fellow of Oriel college, and he gained the chancellor's prize for the two university essays, Latin and English, for the years 1815 and 1817. As a boy, we are told he was shy and retired; as a youth, disputatious, and somewhat bold and unsettled in his opinions; but before he left Oriel, he had won the good opinion of a college which at that time boasted of such names as Copleston, Davison, Whately, Keble, Hawkins, and Hampden. He took deacon's orders in 1818, and the year after settled at Laleham, near Staines, where he occupied himself in preparing pupils for the university. In 1820 he married Mary, youngest daughter of the Rev. John Penrose, rector of Fledborough, in Nottinghamshire, and sister of one of his earliest school and college friends, Trevenen Penrose. About ten years were spent in this quiet and comparatively obscure life; he was preparing himself for the arduous post he afterwards occupied; he was maturing his opinions, and he had also already commenced his great literary undertaking, the *History of Rome*. It was a period which he himself was accustomed to look back upon with some feeling of regret. His letters at this epoch reveal to us a fine ambitious spirit bending cheerfully to the task of tuition, more useful than glorious; they also prove to us that those views of a religious and political character which afterwards distinguished him, were being matured in the privacy of Laleham. "I have long had in my mind," he thus writes to a Mr. Blackstone, "a work on Christian politics, or the application of the gospel to the state of man as a citizen, in which the whole question of a religious establishment, and the education proper for Christian members of a Christian commonwealth, would naturally find a place. It would embrace also an historical sketch of the pretended conversion of the kingdoms of the world to the kingdom of Christ in the 4th and 5th centuries, which I look upon as one of the greatest *tours d'adresse* that Satan ever played. . . . I mean that by inducing kings and nations to conform nominally to Christianity, and thus to get into their hands the direction of Christian society, he has in a great measure suc-

ceeded in keeping out the peculiar principles of that society from any extended sphere of operation, and insuring the ascendancy of his own." He here expresses, in a somewhat sportive and familiar manner, the great principle which he afterwards contended for with so much earnestness, that there should be a Christian laity, a Christian legislature, a Christian government; by which he did not mean a system of laws or government formed in the manner of the Puritans, out of texts of Scripture, rashly applied, but imbued with the *spirit* of the New Testament, and of the teaching of Christ.

It was at Laleham also that A. first became acquainted with Niebuhr's *History of Rome*. This was an era in his life. It produced a revolution in his historical views, and his own *History of Rome* became modeled almost too faithfully on that of the great German.

From Laleham he was called to undertake the arduous duties of the head-mastership of Rugby school. On these he entered Aug., 1828. Our space does not permit us to dwell upon the details of that system of public education which he perhaps carried to its perfection. We can only take notice of the high tone, moral and religious, which he preserved amongst the boys. He had the tact to make himself both loved and feared. He guided with great dexterity the *public opinion of the school*. "In the higher forms," says his biographer, "any attempt at further proof of an assertion was immediately checked. 'If you say so, that is quite enough; of course I believe your word;' and there grew up in consequence a general feeling that it was a shame to tell A. a lie—he always believes one." On one occasion, when he had been compelled to send away several boys, he said: "It is *not* necessary that this should be a school of 300, or 100, or of 50 boys, but it *is* necessary that it should be a school of Christian gentlemen."

But the school was very far from occupying the whole energies of A. The *History of Rome* went on; he took part in all the great questions of the day, political and theological. In politics he was a whig, without being fettered—as we need hardly say—by the ties of party. In the theological discussions of the day, he was chiefly distinguished by the broad views he had adopted of the nature of a Christian church. As already intimated, it was his leading idea that a *Christian people* and a *Christian church* ought to be synonymous expressions. He would never tolerate that use of the word church which limited it to the clergy, or which implied in the clergy any peculiar sacredness, or any traces of mediatorial function. The *priest* was unknown to him in the Christian community; this placed him at once in antagonism to the high church party; and even clergymen of the low church complained that he did not set sufficient value on their sacred order. But all men, of whatever party, admitted and admired the zeal with which he taught that the full spirit of Christianity should permeate the whole of our civil or political life. If he seemed to lower the altitude of the clergy, it was only because he would raise the general level of the laity. He was convinced that "the founders of our present constitution in church and state did truly consider them to be identical, the Christian nation of England to be the church of England; the head of that nation to be, for that very reason, the head of the church." It may be doubted whether this is quite historically correct; but it certainly presents a noble theory to the imagination.

In domestic life, Dr. A. was most happy; here he was distinguished by unfeigned cheerfulness and amiability. In 1832, he purchased Fox How, a small estate between Rydal and Ambleside, and it was in this charming retreat that he enjoyed in the vacations, amongst the family circle, his own uninterrupted studies. Fox How has become a classical spot to every tourist.

For a brief time he held a place in the senate of the London university; he resigned the seat on finding that he could not introduce some measures which he had at heart. In the year 1842, he received from lord Melbourne the offer of the regius professorship of modern history at Oxford. This appointment he accepted with peculiar gratification. He delivered some introductory lectures, which were heard with enthusiastic interest; and it was his intention, on his retirement from Rugby, to enter with zeal upon the duties of his professorship. But this and all other literary enterprises were cut short by a sudden and most painful death. The last vacation was at hand, the journey to Fox How was to be taken in a few days, when he was seized with a fatal attack of spasm of the heart. Few biographies end more abruptly or more mournfully; but the sufferer met his death with perfect fortitude and the full hope of a Christian. He died June 12, 1842. His principal works are five volumes of sermons; the *History of Rome* (3 vols.), broken off by his death at the end of the second Punic war; and an edition of Thucydides. See *Life and Correspondence of A.*, by Rev. A. P. Stanley, M.A., dean of Westminster (1881).

ARNOLD, THOMAS, b. in 1823; bro. of Matthew, author of *English Literature from Chaucer to Wordsworth*, and joint editor, with the Rev. William Addis, of the *Catholic Dictionary*, 1884. He was at one time professor in Dublin University.

ARNOLD, THOMAS KERCHEVER, 1800-53; an English clergyman and author of books on the study of languages. In 1838 appeared the first of his elementary series for Greek, Hebrew, Latin, and several modern tongues, which was followed by school classics, all of which became popular in both England and the United States.

ARNOTT, NEIL, M.D., was b. in 1788 at Arbroath, but his family home was Dysart, near Montrose, Scotland. He was educated at the grammar school of Aberdeen, and subsequently at Marischal college in the same city, where he had the advantage of studying natural philosophy under Prof. Copland, one of the most successful expounders

of mechanical science then living. A. made choice of medicine as a profession; and after going through the medical course at Aberdeen, he went to London in 1806, where he became the pupil of Sir Everard Home, surgeon of St. George's hospital. After spending some years in the naval service of the East India company, he settled in 1811 as a medical practitioner in London. In addition to his extensive general practice, A. was appointed, in 1815, physician to the French embassy, and afterwards to the Spanish embassy. In 1836, Dr. A. was appointed a member of the senate of the university of London, then established by government. He was afterwards elected a fellow of the royal society, and then of the geological society. In 1837, he was named a physician extraordinary to the queen.

In 1823-24, Dr. A. was induced to deliver a course of lectures on natural philosophy in its applications to medicine. The substance of these lectures formed the basis of his *Elements of Physics, or Natural Philosophy, General and Medical*, published in 1827. Of numerous new applications of physical science to medical practice, and to the alleviation of human suffering in general, invented by Dr. A., may be mentioned the water-bed (q. v.). But it is in connection with improvements in the warming and ventilating of houses that the name of Dr. A. is most extensively known. In 1838, he published a treatise on *Warming and Ventilating*; and in 1855, another *On the Smokeless Fireplace, Chimney-valves, etc.* The "Arnott stove" and "Arnott ventilator," which, with characteristic philanthropy and disinterestedness, Dr. A. refrained from patenting, are noticed under WARMING AND VENTILATION. In 1861, he published *A Survey of Human Progress*, full of interesting and enlightened views on improvement generally. In 1864, appeared Part I. of the long-promised revision of the *Physics*; this was followed by Part II., which contains the subjects of optics and astronomy for the first time, and also an interesting supplement entitled *Arithmetic Simplified*. A.'s last publication was a small work on national education. He d. in London Mar. 2, 1874. In the year 1859, he expressed a wish to a friend to make a contribution to Marischal college, Aberdeen, in aid of a course of lectures on natural philosophy, to be available to young men not regular students of the university. The union of the two Aberdeen colleges interfered with the project, and a few years later he gave £1000 to the united university, to provide a scholarship in natural philosophy. This was followed by the same gift to each of the other three Scottish universities, and, for Aberdeen, a further gift of £500 to the mechanics' institution. In London, Mrs. Arnott had already given £1000 to each of two colleges for young ladies, to constitute scholarships for natural philosophy. In 1872, Dr. A. intimated through Dr. Lyon Playfair that he meant to repeat his gift to the Scottish universities; but, in consequence of a fall, his faculties had been permanently impaired, and he was no longer capable of continued thought or decision. An attack of cold in 1858 had permanently affected his hearing; but otherwise, his last years were characterized by his usual flow of spirits.

ARNOT'TO, **ARNATTO**, **ANNOTTA**, **ANNATTO**, or **ROUCOU**, also known on the continent of Europe by the name of **ORLEAN**, is a red coloring matter, which is obtained in South America and the West Indies from the reddish pulp surrounding the seeds of the Arnotto-tree (*bixa orellana*) by washing, maceration, fermentation, and subsequent evaporation. It appears in commerce in cakes or balls of 2 to 4 lbs. weight, wrapped up in leaves, externally brown, internally of a pale blood-red or yellowish-red color, and which have a peculiar animal smell and an astringent taste. Pure A. seldom appears in the market. It is obtained by the mere rubbing off and drying of the red pulpy pellicle which covers the seed; but that which is thus obtained is very pure, and occurs in small round or angular lozenges. The Indians rub this coloring matter into the skin of their whole body, thus intending both to adorn themselves, and to obtain protection against the bites of mosquitoes. Amongst us, A. is used in medicine for coloring plasters, ointments, etc.; and to a considerable extent by farmers for giving a rich color to cheese. It is also used in dyeing, although it does not produce a durable color. It is employed to impart an orange tint to simple yellows. It is an ingredient in some varnishes. It dissolves in alkalies, producing a brown solution, from which it is precipitated yellow by acids. It imparts little color to water, but dissolves in alcohol; alum and sugar of lead throw down a brick-red precipitate from the alcoholic solution. In South America, A. is very extensively mixed with chocolate, not only for the sake of the color, but also for the improvement of the flavor.—The genus *bixa* belongs to the natural order flacourtiaceæ (q. v.), and is distinguished by complete flowers with simple stigma, a hispid calyx of five sepals, and a two-valved capsule. The A. shrub is a native of tropical America, but has been introduced into other warm countries. It grows to the height of 7 or 8 ft., and has heart-shaped pointed leaves, and large flowers of a peach-blossom color, which grow in loose clusters at the extremities of the branches. The capsules are oblong, and contain 30 to 40 seeds enveloped in red pulp (the A.). The seeds are said to be cordial, astringent, and febrifugal. The roots are used in broth. They have the properties of A. in an inferior degree.

ARNOULD, **SOPHIE**, 1744-1803; a French opera singer. She was the daughter of a hotel-keeper; with a good education, fine voice, and attractive face and form, aided by natural wit, she gained the favor of Madame de Pompadour and other women of the court, and first appeared on the stage at the age of thirteen. She drew around her many

of the leading men of the time, even such as Rousseau, Diderot, and Helvétius, and had a triumphant career for more than 20 years. One of her sons was a colonel, and was killed at Wagram.

ARNOULD-PLESSY, JEANNE SYLVANIE, b. Lorraine, 1819; daughter of an actor. She studied at the Paris conservatory; made her debut at the *Théâtre Français*, 1834, soon after becoming an associate of the *Comédie Française*, of which she became a pensionnaire abt. 1846, retiring, 1876. During her career she personated over 130 characters. She married, 1845, M. Arnould, a dramatic writer, who d. 1854.

ARNSBERG, one of the three departments of the Prussian province of Westphalia (q. v.), having an area of 2900 sq. m., and a pop. (1890) of 1,342,677. With the exception of the valley of the Lippe, the whole department belongs to the highlands of the lower Rhine. Only in a few of the valleys is there good arable soil; on the other hand, there is a great deal of good timber, more than a third of the whole area consisting of forests. But the principal resources of the district are its subterranean riches, in coal, iron, lead, silver, etc. Its abundant water-power has also led to the establishment of numerous factories, mills, etc. **ARNSBERG**, the chief t. of the department, is situated on the Rhur, 44 m. s.e. from Munster; pop. 6733. It has several manufactures, such as linen, broad-cloth, potash, etc. In the orchard below the castle is still pointed out the spot where the famous Femgerichte (q. v.) of A. was held.

ARNSTADT, the chief t. in the principality of Schwarzburg-Sonderhausen, is situated in a picturesque country on the banks of the Gera, 12 m. s. of Erfurt, and has a pop. (1895) of 13,595. It is one of the oldest Thuringian cities, its existence being traceable as far back as 704 A.D. Formerly it was the chief emporium for the trade in fruit and timber between the fertile lowlands and the Thuringian forest region, but is now a manufacturing town, employing a very considerable number of hands in weaving, glove-making, brewing, pottery, etc. A rich vein of rock-salt has been recently discovered in the neighborhood of the t., and a new copper-mine opened.

ARNSWALDE, or ARENSWALDE, a t. in the province of Brandenburg, 41 m. s.e. from Stettin; pop. about 7000. It is noted for the manufacture of linen and woolen goods, chemicals, and church bells.

ARNULF, or ARNULPHUS, a king of Germany, great-grandson of Charlemagne. About 894 A.D., he captured Rome, where the Pope crowned him as emperor. He d. in 899, and his son succeeded him as Louis IV.

ATOLSEN, a t. in Waldeck, on the Aar, 12 m. n. from Waldeck; pop. 1890, 2620. It has many works of art, and a fine library. Kaulbach, the painter, was born here.

AROMA, a term sometimes employed to designate those substances the extremely minute particles of which are supposed to affect the organ of smell so as to produce particular odors, and frequently as synonymous with *odor*. The particles diffused through the atmosphere, and affecting the olfactory nerves—if the theory of particles of matter so diffused be correct—must indeed be extremely minute, as odoriferous substances such as musk, the smell of which is felt at a considerable distance, continue to diffuse their odor, and according to this theory, these particles, for years, without sensible diminution of weight. See *Nose*, etc. The term A. is usually employed only with reference to particular kinds of odors, not easily defined or distinguished in words. Thus, we speak of the A. of roast-meat, and of the A. or aromatic smell of hyssop, mint, and other plants. Aromatic smells are very characteristic of some natural orders of plants, as *labiata* (mint, etc.) and *compositæ* (milfoil, etc.). They have been very generally supposed to depend upon essential oils, but resins are often equally aromatic.

AROMATICS constitute a class of medicines which owe their properties to the essential oils, to benzoic and cinnamic acids, to volatile products of distillation, or to odorous glandular secretions. The plants that contribute to this class of medicines are those which yield essences, camphor, or odorous resins, and amongst the families which yield the most important aromatics are the *labiata*, *umbellifera*, *lauraceæ*, *myrtaceæ*, *aurantiaceæ*, *conifera*, *scitamineæ*, *orchideæ*, etc. In some cases, the aromatic matter is diffused throughout all parts of the plant, but it is usually condensed in particular organs, such as the root, in the case of ginger and galanga; or the bark, in the case of cinnamon, canella, and cascarella; or the flowers, as in the case of cloves; or the fruit, as in the case of anise and vanilla; or the wood, as in the case of sandal-wood and aloes-wood; or the leaves, as in the case of most of the *labiata*, *umbellifera*, etc.

A. may be arranged in the following sub-classes: (1) Those in which the active principle is an essential oil, as the oil of thyme, lavender, cajeput, neroli, fennel, etc. (2) Those containing camphor, or an allied body, such as artificial camphor obtained from turpentine. (3) Bitter aromatics, in which there is a mixture of a bitter principle and an essential oil, as chamomile, tansy, wormwood, etc. These are tonics and vermifuges. (4) Those of which musk is the type, such as civet and amber; and certain plants with a musk-like odor, such as *malva moscata*, *mimulus moschatus*, and *hibiscus abelmoschus*. (5) Those containing a fragrant resin, as benzoin, myrrh, olibanum, storax, and the balsams of Peru and tolu, which possess stimulant properties. (6) Lastly, those which are artificially produced by destructive distillation, as tar, creosote, benzol, or the various empyreumatic oils.

As a general rule, these substances act as diffusible stimulants of more or less power, and as antispasmodics, while those in which a bitter principle is present act as vermifuges and tonics. The whole class were formerly regarded as possessing disinfectant and antiseptic properties, and there is no doubt that some, as coal-tar, creosote, etc., strongly possess this property. In this country we usually associate aromatics with other medicines; but in France aromatic infusion, lotions, baths, etc., are much prescribed. It will suffice to give the composition of aromatic infusion as an illustration. Take equal parts of the leaves of sage, ordinary and lemon thyme, hyssop, origanum, wormwood, and mint. Infuse 50 parts of these leaves in 100 parts of boiling water.

AROMATIC VINEGAR differs from ordinary vinegar (which is acetic acid diluted with water) in containing certain essential oils which impart an agreeable fragrance. It is generally prepared by adding the oils of cloves, lavender, rosemary, and *acorus calamus* (and sometimes camphor) to crystallizable acetic acid, or by distilling the acetate of copper in an earthen retort and receiver, and treating the liquid which passes over with the fragrant oils mentioned above. A. V. is a very pleasant and powerful perfume; it is very volatile, and when snuffed up by the nostrils is a powerful excitant, and hence is serviceable in fainting, languor, headache, and nervous debility. A. V. is generally placed on a sponge in a smelling-bottle or in a *vinaigrette*; it can also be purchased as a liquid in vials; and a drop or two allowed to evaporate into a sick room overpowers, but does not destroy, any unpleasant odor. The liquid must, however, be cautiously dealt with, as it is a very corrosive substance.

ARONA, a t. in Piedmont, on the w. shore of lake Maggiore, with a dockyard on the lake, gymnasium, hospital, and a number of churches, in one of which is an altar-piece by Gaudenzio Vinci; pop. 3443. The town has trade with Germany and Switzerland. There is a statue here to count Carlo Borromeo, who was born in the now ruined castle in 1538, and canonized for piety and benevolence. It is of bronze and copper, 110 ft. high, including the pedestal of 44 ft. It is hollow, and four persons can stand in the head, where they get an extensive view through the eyes.

ARONIA. See *CRATÆGUS*

AROOSTOOK, a river which, rising in the n. of Maine, falls into the St. John in New Brunswick, after a course of about 120 m. It possesses an historical interest from its connection with the long-agitated question of the n.e. boundary between British America and the United States.

AROOSTOOK, a co. in the extreme n.n.e. of Maine, bordering on British America; 6700 sq.m.; pop. '90, 49,589. The surface is rough, and there are several mountain-peaks. The St. John river forms the eastern boundary, and is navigable for light vessels. There are also the Aroostook, the Mattawamkeag, and several smaller streams, with many lakes and ponds. Most of the region is still covered with primeval forests. Co. seat, Houlton.

AROUET. See *VOLTAIRE*.

ARPAD, the national hero of Hungary, was the son of Amos, the leader under whom the Magyars first gained a footing in Hungary. He was chosen duke on his father's death in 889, and by a course of incessant and mostly successful warfare with the Bulgarians, Wallachians, Moravians, etc., extended the first conquests of the Magyars on all sides. He also made more than one successful incursion into Italy about 900, and returned laden with booty. He died in 907, leaving his son in possession of the supreme command. The A. dynasty became extinct in the male line with Andreas III. in 1301. A. yet lives in the popular songs of the country, and his history, even in the oldest chronicles, is mixed up with a deal of legendary matter.

ARPAD. See *ARAD*.

ARPEGGIO, in music, a chord of which the notes are given, not contemporaneously, but in succession. From any one chord, several forms of A. may be produced. Bass-chords thus treated form an *Alberti bass*, so named from Domenico Alberti (1730-1740), a popular singer and player, who often played the bass in this style.

ARPENT is the old French land-measure, corresponding to our acre. The name is from the ancient Gallic *aripennis*, which was identified by Columella with the Roman *actus*, or half *jugerum*. Ordinarily an A. may be reckoned as five sixths of an acre; but the precise comparative value of the three most in use will be seen in the following table

	French hectares.
Acre, English imperial or statute.....	0.40466
Arpent, of Paris.....	0.32400
“ d’ordonnance.....	0.48400
“ common.....	0.40000

ARPIÑO, the *Arpinum* of the ancients, a t. of southern Italy, the birthplace of Cicero and Caius Marius, is situated in the province of Caserta, 65 m. n. by e. of Naples. It stands on the lower ridge of a lofty hill, some 6 m. to the left of the river Garigliano, the ancient Liris. The old t., in early Roman times, was built on the top of a steep rock, forming part of the territory of the Volscians. Many remains of the ancient structures are still to be seen, especially a cyclopean wall, which runs along the northern brow of

the hill occupied by the present t., and extending to the ancient citadel. About the year 188 B.C., the citizens received the freedom of the city of Rome, with all its privileges, and Arpinum, during the later years of the republic, was a flourishing municipal town.

Manufactures of woolen cloth, parchment, paper, and leather are carried on. The t. has a charming appearance from the highly picturesque character of the surrounding woods and mountains. Iron, white marble, variegated red marble, and marble of a yellowish color, are got in mines and quarries in the neighborhood. Population about 12,000.

ARQUA, a village in the province of Padua, Venice, 12 m. s.w. of Padua, in the heart of the Euganean hills. Pop. 1200. Petrarch's furniture is still preserved in the house in which he died here (July 18, 1374), and his monument of red marble is to be seen in the churchyard.

ARQUEBUS, or **HARQUEBUS**, was the first form of hand-gun which could fairly be compared with the modern musket. Those of earlier date were fired by applying a match by hand to the touch-hole; but about the time of the battle of Morat, in 1476, guns were used having a contrivance suggested by the trigger of the arbalest or cross-bow, by which the burning match could be applied with more quickness and certainty. Such a gun was the A. Many of the yeomen of the guard were armed with this weapon, on the first formation of that corps in 1485. The A. being fired from the chest, with the butt in a right line with the barrel, it was difficult to bring the eye down low enough to take good aim; but the Germans soon introduced an improvement by giving a hooked form to the butt, which elevated the barrel; and the A. then obtained the name of the *haquebut*. Soldiers armed with these two kinds of weapon were designated *arquebusiers* and *haquebutters*—the former were common in the English army in the time of Richard III., the latter in that of Henry VIII.

ARRACA'CHA, *Arracacha esculenta*, a plant of the natural order *umbelliferae*, a native of the elevated table-lands in the neighborhood of Santa Fé de Bogota and Caracas, and of regions of similar climate in other parts of tropical America. It is much cultivated in its native country for its roots, which are used as an esculent. The root divides into a number of parts, which resembles cows' horns or large carrots. When boiled, they are firm and tender, with a flavor not so strong as that of a parsnip. The plant is very like hemlock, and has a similar heavy smell. Humboldt, indeed, referred it to the genus *conium* (hemlock), but it has since been made the type of a new genus. The flowers are in compound umbels, and are of a dull purple color. The A. was at one time very strongly recommended as a substitute for potatoes; it was introduced into Britain through the exertions of the horticultural society, and its cultivation perseveringly attempted; but it has been found unsuitable to the climate of Britain and of other parts of Europe, where it has been tried, perishing on the approach of the frosts of winter without having perfected its roots. The dry weather of summer is also unfavorable to it. The climate of the s. of Ireland resembles that of its native regions more than any other in the British islands. It seems to require a very regular temperature and constant moisture. There are probably some parts of the British colonies in which the A. would be found a very valuable plant. In deep loose soils, it yields a great produce. It is generally propagated, like skirret, by offshoots from the crown of the root. By rasping the root and washing, a starch, similar to arrowroot, is obtained.—There is another species of the same genus, *A. moschata*, a native of the same regions, the root of which is uneatable.

AR'RAK, **RACK**, or **RAKI**, is the East Indian name for all sorts of distilled spirituous liquors, but chiefly for that procured from toddy or the fermented juice of the cocoa and other palms, and from rice. The palms in other tropical countries furnish a fermented beverage similar to the toddy of India, and in a few instances also it is distilled, but arrack essentially belongs to India and the adjacent countries. The cocoa-nut palm (*cocos nucifera*) is a chief source of toddy or palm-wine, and is obtained from trees ranging from 12 to 16 years old, or in fact at the period when they begin to show the first indication of flowering. After the flowering shoot or spadix enveloped in its spathe is pretty well advanced, and the latter is about to open, the toddy-man climbs the tree and cuts off the tip of the flower-shoot; he next ties a ligature around the stalk at the base of the spadix, and with a small cudgel he beats the flower-shoot and bruises it. This he does daily for a fortnight, and if the tree is in good condition, a considerable quantity of a saccharine juice flows from the cut apex of the flower-shoot, and is caught in a pot fixed conveniently for the purpose, and emptied every day. It flows freely for fifteen or sixteen days, and less freely day by day for another month or more; a slice has to be removed from the top of the shoot very frequently. The juice rapidly ferments, and in four days is usually sour; previous to that it is a favorite drink known in India by the natives as callu, and to the Europeans as toddy. When turning sour, it is distilled and converted into A., known better to the Hindus by the name of nari, and by the Cingalese as pol or nawasi. A similar spirit is made pretty largely from the magnificent fan-leaved palm, *borassus flabelliformis*, and also from the so-called date-sugar palm, *arenga saccharifera*. Large quantities of arrack are made from fermented rice prepared as

malt—both in India, Ceylon, and Batavia; in the last-mentioned place sugar and molasses are also added to the rice.

It is probable that the use of arrack is more widely diffused among the human race than the produce of the vine (wine and brandy) and of barley (whisky, beer). The date-palm of the Sahara, the oil palm of west Africa, and the cocoa-nut palm of the Pacific islands are made to yield it.

The unscientific method of preparing these alcoholic spirits renders them generally very distasteful to European taste, the process of rectification being rarely, if ever, employed. Some carefully prepared samples of great age, however, find favor, and are used in making punch and other drinks, not only in India and Java, but small quantities also find their way to Britain, for the gratification of palates trained in India. The cocoa-nut tree is especially valuable for this industry, because it bears twelve times in the year after it once begins, and continues to do so for as much as 40 years. It is the rule, therefore, to prevent undue exhaustion of so valuable a tree, to discontinue the collection of juice at intervals, and allow the natural process of fruit-bearing to go on: in this way it is usual to divide the year between the two crops. Of late years a considerable amount of rum has been produced in the East Indies from the sugar-cane, and the molasses yielded by it. This is often called arrack by the natives, and leads to errors as to the statistics of the latter material. The word saki, used by the Japanese for rice spirit, seems only an alteration of *raki* or arrack. An imitation A. is prepared by dissolving benzoic acid in rum, in the proportion of 20 grains of the former to 2 lbs. of the latter.

AR/RAGONITE, a mineral essentially consisting of carbonate of lime, and so agreeing in chemical composition with calcareous spar (q.v.), but differing from it in the form of its crystals, of which the primary form is a rhombic prism with angles of $116^{\circ} 16'$ and $63^{\circ} 44'$, the secondary forms being generally prismatic and pyramidal. The effect of heat on them shows another difference, A. being reduced to powder by a heat in which calcareous spar remains unchanged. Such differences between minerals of the same chemical composition appeared very improbable, and when Stromeyer, in 1813, detected the presence of a little carbonate of strontia in A., they were immediately ascribed to this as their cause; but it has since been shown not only that the quantity of strontia is very small, variable, and therefore to be regarded as accidental, but also that the differences between the two minerals may be accounted for by difference of temperature when crystallization was taking place. A. appears to be the product of a crystallization taking place at a higher temperature than that in which calcareous spar is produced; and accordingly it is frequent in volcanic districts and in the neighborhood of hot springs, as at Carlsbad. It is frequently found in trap-rocks, as in Scotland. It derives its name from the province of Aragon in Spain. It sometimes occurs stalactitic. Its crystals are sometimes prisms shortened into tables, sometimes they are lengthened into needles. Twin crystals (*maeles*) are very common. *Satin spar* is a variety of it, in which the crystals are of a fine fibrous silky appearance, and combined together into a compact mass. *Flos ferri* (i.e., flower of iron) is a name given to a coralloidal variety which sometimes occurs in iron mines.

AR/RAH, a t. in the district of Shahabad and the presidency of Bengal, in lat. $25^{\circ} 31'$ n., and long. $84^{\circ} 43'$ e. It is situated in a fertile country, and contains, according to the census of '91, a pop. of 47,000. It is on the route between Dinapore and Ghazepore, 25 m. w. of the former, and 75 e. of the latter. During the mutiny of 1857, A. became in variety and intensity of interest second only to Cawnpore, Delhi, and Lucknow, connected as it was with a heroic defense, a heavy disaster, and a brilliant victory. The defense was that of an isolated house, for eight days, against 3000 Sepoys, with 2 field-pieces, the garrison consisting of less than 20 whites, all civilians, and 50 Sikhs, whose fidelity perhaps was doubtful till proved by trial. The disaster was the nocturnal surprise in the jungle of a detachment almost entirely European, sent to the relief of the beleaguered dwelling—the loss having been 290 out of 415. The victory was won by a force of 172 men, 12 of them mounted volunteers, and 3 guns, over a host numbering nearly 20 to 1. In fact, A., happily with the exception of the cold-blooded massacre of women and children, presented, in miniature, nearly all the phases of the most formidable and eventful insurrection on record. For a detailed account of these events, see *Chambers's History of the Indian Revolt*.

ARRAIGNMENT, in the practice of the criminal law in America, means calling a prisoner by his name to the bar of the court to answer the matter charged upon him in the indictment. And having the presumption of innocence in his favor, it is the law, and so laid down in the most ancient books, that, though charged upon an indictment of the highest nature, he is entitled to stand at the bar in the form and in the garb of a freeman, without irons or any manner of shackles or bonds, unless there be evident danger of his escape, or of violence at his hands. When arraigned on the charge of treason or felony, the prisoner is called upon by name to hold up his hand, by which he is held to confess his identity with the person charged. This form, however, is not an essential part of the proceedings at the trial, and it is sufficient for the prisoner, when arraigned, to confess his identity by verbal admission or otherwise. When thus duly arraigned, the indictment is distinctly read over to the accused in the English tongue, and he then either confesses the fact—that is, admits his guilt—or he puts himself upon his trial by a plea of *not*

guilty. Formerly, one of the incidents of the A. was the prisoner *standing mute*, as it was called—that is, refraining from, or refusing, a direct answer to the indictment; in which case the court proceeded to inquire whether the silence was of malice on the part of the prisoner, or was produced by the visitation of God, and to deal with him accordingly.

According to Sir Matthew Hale, the term A. is derived from *arraisonner*, *ad rationem ponere*, to call to account or answer, which in ancient French law would be *ad-resoner*, or, abbreviated, *a-resner*. See TRIAL, INDICTMENT, INFORMATION, PROSECUTION, PLEA, VERDICT, NOT PROVEN.

ARRAN, an island in the mouth of the Firth of Clyde, Scotland, about 5 m. s.w. of Bute, 13 w. of Ayrshire, and 4 e. of Cantire, from which it is separated by Kilbrennan sound. It is of an oval form, about 20 m. long and 12 broad; area, 165 sq.m., about 15,000 acres, or a seventh part, being cultivated. Pop. '91, 4824. The general aspect of A. is mountainous and heathy, and in the n., the jagged peaks are singularly grand. Around the coast is a low belt of ground, with lofty cliffs on the s. and s.w., from which the country rises abruptly. The highest point is Goatfell (in Gaelic named *Gaoth Bheinn* or *Beinn Ghaoith*, "Wind mountain"), an obtuse pyramid, 2865 ft. high, and a prominent feature of the island. From its sides slope the romantic glens of Rosa and Sannox, and at its base to the s.e. opens Brodick bay, at the head of which lay, until lately, Brodick village. The houses which composed it have now been removed, and a new village has sprung up on the opposite side of the bay, called Invercloy, where there is a spacious hotel. To the s. of this, round a bluff headland, is Lamlash bay, the chief harbor of A., and the best on the Firth of Clyde, sheltered by Holy Island, once the seat of a monastery. A picturesque mass of columnar basalt, 900 or 1000 ft. high, succeeds. Further s. lies Whiting bay, near which are two cascades 100 and 50 ft. high respectively. At the s.e. point of A. is Kildonan Castle, opposite which is the small isle of Pladda, crowned by a light-house. Large caverns occur in the cliffs of the s. and s.w. coasts. In one of these, the "king's cave," in the basaltic promontory of Druimodune, Robert the Bruce hid himself for some time. Shiskan vale, opening into Druimodune bay, is the most fertile part of A. Loch Ranza, a bay in the n. end of A., runs a mile inland, and is a herring-fishing rendezvous. There is daily communication with A. by means of steamboats from the Clyde, the ports touched at being Brodick, Lamlash, and Corrie.

The geology of A. is almost unique, and displays a greater succession of strata than any other part of the British isles of equal extent. The s.e. half of A. consists of Devonian sandstone, extending from the e. coast 4 or 5 m. inland, and running s.w. from Brodick beyond the center of the island; and of trap-rocks and carboniferous strata, which occupy the middle and western portions. The n.w. half consists of a central granite nucleus, including Goatfell, bordered on the w. by a tract of mica-slate, and on the n., e., and s. by lower silurian rocks, which, again, have a run of devonian sandstone on the e. and south. Lias and oolite lie on the mica-slate. There are only rivulets in A., and one of them tumbles over a precipice 300 ft. high. Some level parts in the s. half of A. are fertile. The chief crops are oats and potatoes. Cattle, sheep, fish, and oats are exported. The greater part of A. belongs to the duke of Hamilton, whose seat is Brodick Castle. A. forms part of the county of Bute, and contains two parishes. Many antiquities occur, such as cairns, unhewn obelisks, monumental stones, and Druidical circles. Several stone coffins were found in a cairn 200 ft. in circumference. Loch Ranza castle, now in ruins, was once a residence of the Scots kings. See Landsborough's *Arran*, etc. (1875).

ARRAN, SOUTH ISLES OF. These are three small islands lying n.e. and s.w. across the entrance to Galway bay, about 4 m. off the w. coast of Ireland, and 27 w. of Galway city. They form the barony of A., and give the title of earl to the Gore family. Total area, 11,287 acres. The principal or w. island, Inishmore, is 7 m. long and 2 broad; Inishmaan, or "Middle isle," comes next; and then Inishere to the southeast. They have a small population, two-thirds of which inhabit Inishmore. The islands consist of the carboniferous limestone of the bed of Galway bay, and rise to the height of 100 to 200 ft. on the w. side, ending in cliffs facing the Atlantic. The soil is exceedingly sandy, but most of the land is rudely cultivated. The chief crops are rye, oats, and potatoes. Most of the inhabitants engage in fishing, but a good many depend on kelp-burning. They are subject to famines from parching rainless west winds in August destroying the potato-crop. These islands contained at one time 20 churches and monasteries. Inishmore was the center of these, still known as Aran-na-naomh, or "Arran of the Saints." Many pilgrims still visit the old shrines and relics scattered through the islands. St. Kenanach church, built in the 7th c., still exists, all but its stone roof, as well as the stone oratories and little beehive stone huts of the monks of the 6th and 7th centuries. There are nine circular cyclopean fortresses of unhewn uncemented stones (portions of the walls still being 20 ft. high), supposed to have been built in the 1st c. by the Fir-Bolg or Belgæ. The largest of these, Dun-Aengus, on a cliff in Inishmore, 220 ft. high, is one of the most magnificent barbaric monuments in Europe.

ARRANGING, a term in music which means the adapting of a piece of music so as to be performed on an instrument or instruments different from those for which it was originally composed, as when orchestral or vocal compositions are set for the piano-forte, or the reverse. An arrangement is often a mere lifeless transposition of the original, the only guiding principle being the mechanical possibility of performance. Of this kind are most of the piano-forte arrangements of the orchestral works of Mozart, Beethoven, etc.—partly from the arranger working merely for hire, and partly from a mistaken reverence for, and fear of altering, the original. It is different when an arranger, who thoroughly comprehends the spirit of the original, takes advantage of the peculiar means of expression afforded by the new form of presentation, to reproduce as much as possible the original effects. In this last respect, the arrangements of Franz Liszt have excelled all others, although in some cases he may have overstepped the boundary of propriety. See POT-POURRI and FANTASIA.

ARRAS (the ancient *Nemetacum*), a fortified t. and capital of the department of Pas-de-Calais, as it was formerly of the province of Artois, in France. It is situated on the banks of the Scarpe, partly on an eminence, and partly on a plain, and consists of four divisions—the city, upper town, lower town, and citadel. It is a principal station on the French Northern railway, distant from Paris by this route 134 m., and from Brussels, 97. The pop. in 1891 was 20,100. The houses are of hewn stone, and in the lower town they are handsomely built and uniform; the streets straight and wide, set off with several fine squares and many beautiful public buildings. Among the principal edifices are the cathedral of Notre Dame, the residence of the prefect, the town-hall, the theater, and the public library.

A. ranks as a fortified town of the third class, its fortifications being the first that were constructed by the celebrated Vauban, according to his own system. It has been the seat of a bishop since 390 A.D., and two ecclesiastical councils have been held here—one in 1025, the other in 1490.

The corn market of A. is the most important in the n. of France. Its principal manufactures are beet sugar, agricultural implements, hosiery, lace, pottery, and leather. Its trade, which is considerable, is in corn and flour, oil, wine, and brandy, with the industrial products of the city.

It appears from the writings of Jerome that A. was remarkable for its woolen manufactures in his time; and afterwards, during the middle ages, it was famed for its tapestry; indeed, the name of the town was transferred to this article of manufacture, and *arras* was the name given in England to the richly-figured hangings that adorned the halls of the kings and the barons.

In 1482, A. with Artois was ceded by the states of the Netherlands to Louis XI. of France; but the inhabitants having revolted, the king laid siege to the town, stormed it, and slew or expelled the people, whom he replaced by others brought from all parts of his dominions, ordering the city to be thenceforward called *Franchise*, to obliterate the very name of A. Soon afterwards (1493) it was ceded to Maximilian of Austria, and was possessed by the Spanish branch of the house of Hapsburg till 1640, when Louis XIII. of France took it after a long siege. By the treaty of the Pyrenees, it was finally ceded to France. A. suffered much in the time of the first French revolution, especially in the year 1793. Robespierre, the terrorist, was a native of the town.

ARRAS, hangings for rooms covered with a pattern like wall paper. It derived its name from the fact that it was woven chiefly in the French town of Arras (q.v.).

AR'RAWAKS, or LOKONO, a native tribe, once powerful, in Dutch Guiana, but of peaceful character and friendly with whites. Nearly 200 years ago a Roman Catholic missionary undertook to civilize them, mastered their language, and gave them printed works. The family was the foundation of such government as they had, and descent followed the female line.

ARRAYER, a title given to certain military officers in England in the early part of the 15th century. There were two of them in each co., sometimes called commissaries of musters. Their duties were set forth in an ordinance of Henry V., from the terms of which it appears that the arrayers were army inspectors, or, rather, militia inspectors, and in some sense precursors to the modern lord-lieutenant of counties.

ARREST is a legal term used both in criminal and civil process. Criminal A. has already been sufficiently considered under the word APPREHEND (q.v.); and in civil procedure it may be simply defined to be the execution of a judicial or prerogative order, by which the liberty of the person may be restrained, and obedience to the law compelled. In the practice of the court of chancery, a defendant may be arrested for his contempt in not putting in his answer to a bill filed against him; and persons in all the superior courts may be arrested or attached for contempt. But in its ordinary legal acceptation, A. is used to signify the enforcement of the judgment or order of a court of law, in order to satisfy justice. In the execution of such judgment, the party against whom it has been given may be arrested by means of a writ of *capias ad satisfaciendum*, or a *ca. sa.*, the purpose of which is to imprison the body of the debtor till he pays the debt or damages and costs.

In the United States the laws of arrest are nearly the same as in England. Any individual present at the commission of a felony, or who knows that another has committed a felony, can arrest the offender without a warrant and take him before a magistrate. In civil matters an A. must be made by an authorized officer, usually a sheriff, or his deputy, or a constable; or in cases in federal court by a marshal; in legislative bodies by a sergeant-at-arms. Certain persons and classes are exempt from civil A., either generally or in special relations indicated; such as ambassadors and their assistants, attorneys duly acting for their clients, voters attending election, insolvent debtors legally discharged, legislators attending the bodies of which they are members, militia while doing military duty, parties to a suit while attending court, witnesses in such cases, women in certain cases, and, in some states, persons giving bail for others, and clergymen while performing service. Civil A. is unlawful on Sunday or on public holidays, or in presence of a court, or in the defendant's residence. Since the very general abandonment of imprisonment for debt, civil A. has become rare, but is resorted to in case of apprehended frauds, such as concealing property, or absconding, and in certain actions brought for wilful injury to person, character or property, etc. For crime, any person is liable to A. except ambassadors and their official assistants; and any necessary force, even to killing, may be used to accomplish the A.; but it is murder to kill the person who is trying to effect the A.

ARREST OF JUDGMENT, in the practice of the English common law courts, was an expedient after verdict on the part of an unsuccessful defendant, who endeavored to get the judgment arrested or withheld, on the ground that there was some error which vitiated the proceedings; and if this objection succeeded, it was fatal, no amendment being allowed after trial. But as this rule was found to be productive of great inconvenience, expense, and often injustice, it has been considerably modified by the common law procedure act of 1852. Where a plaintiff is not entitled to a verdict a motion for A. of J. is usual; or if no such motion be made, the court may produce the same effect by suspending its own decision. Under A. of J., all the proceedings are set aside, and acquittal is granted; but this does not bar a new indictment.

AR RHENATHERUM, a genus of grasses, allied to *holcus* (see **SOFT GRASS**) and *avena* (see **OAT**), and distinguished by a lax panicle, 2-flowered spikelets with two glumes, the lower floret having stamens only, and a long twisted awn above the base; the upper floret perfect, with a short straight bristle below the point.—The name A. is from the Greek *arrhen*, male, and *ather*, an awn. *A. avenaceum* (*avena elatior* of Linnæus, also known as *holcus avenaceus*) is a common grass in Britain. It is sometimes called **OAT-LIKE GRASS**, from the resemblance to the coarser kinds of oats in the general appearance of the panicle. In France it is very much cultivated for fodder, and is often called **FRENCH RYE-GRASS**. It has, however, no affinity to the true rye-grass (*lolium*).

ARRHIDÆUS, PHILIP, a son of the father of Alexander the Great by a dancing girl of Larissa. He was at Babylon when Alexander d., 323 B.C., and though almost imbecile was elected king, under the name of Philip, with the understanding that a child (then unborn) of Alexander was to be associated with him in the government. The next year Arrhidæus married Eurydice, who thereafter had complete control over him. Two years later he and his wife were captured by Polysperchon, the leader of the cause of Alexander's son mentioned above, and both were put to death by the order of Olympias, the grandmother of the young king. They were afterwards honored with decent burial, and funeral games were celebrated as memorials of them.

ARRIA, the wife of Cæcina Pætus, who, for treason to the emperor Claudius, was ordered to end his own life by suicide. When A.'s husband hesitated, she seized the dagger, drove it to the hilt into her own breast, and then handed it to him, saying calmly, "Pætus, it does not pain me." She fell dead, and the husband at once dispatched himself with the reeking weapon.

ARRIÄNUS, FLAVIUS, a native of Nicomedia, in Bithynia, b. about 100 A.D. He became a disciple of Epictetus, the Stoic philosopher, and, under his instructions, a warm advocate of that system. On bringing before the public the earliest products of his pen, the learned men of Athens were highly pleased with them, and honored him with the freedom of their city. A. had chosen Xenophon as his model of composition, and hence the Athenians called him the young Xenophon. In 124 A.D., he was introduced to the emperor Hadrian in Greece, who conferred on him the freedom of the eternal city. He was appointed prefect of Cappadocia in the year 136. Under Antoninus Pius, the successor of Hadrian, he was promoted to the consulship. But some four years afterwards, he appears to have retired from public life, and devoted himself to literature in his native place. As the pupil and friend of Epictetus, he edited the manual of ethics (*Encheiridion*) left by his master, and wrote the *Lectures of Epictetus*, in 8 books, of which only 4 have been preserved—to be had in Schweighäuser's *Philosophie Epictetæ Monumenta*, vol. iii. (Paris, 1827). He wrote also *The Conversations of Epictetus*, a work which has been lost, except a few fragments. The most important work by A. is the *Anabasis of Alexander*, or *History of the Campaigns of Alexander the Great*, which has come down to us entire, all but a gap in the 12th chapter of the 7th book. This book is our chief authority on the subject of which it treats, and is a work of great value. In close connection with it, A. wrote his *Indian History*, giving an account of the people of India. Other writings by A., his letter to Hadrian on *A Voyage round the Coasts of the Euxine Sea*, and another, *A Voyage round the Coasts of the Red Sea*, are valuable with

regard to ancient geography. There is still another work by our author—a treatise on the chase (*Kynegeticos*)—in which, as well as in the *Anabasis*, he has imitated Xenophon.

A. was one of the best writers of his day. His works bear the marks of care, honesty, and correctness; and they were numerous, though several have not been handed down to our time. All that we are possessed of appear to have had translations into Latin. There is a good French translation of the *Anabasis* by Chaussard, with commentary, 3 vols. (1802), and also a good one of the *Lectures of Epictetus* by Thurot (1838). The best critical edition of A. is that by Müller (Paris, 1846).

ARRO'BA, a weight commonly used in Spain, Portugal, Brazil, and in the principal Spanish and Portuguese colonies. In the first of these countries, it is equivalent to the English quarter of a cwt., or 28 lbs.; it is nearly the same in Portugal, etc. In Spain, the A. is also a measure for wine, brandy, etc., and contains four of our quarts.

ARRONDISSEMENT (from the French *arrondir*, to make round), the subdivision of a French department (q. v.).

ARROW. See ARBALEST; ARCHERY.

ARROWHEAD, *Sagittaria*, a genus of plants of the natural order *alisraceæ*, distinguished by unisexual flowers, having three herbaceous sepals and three colored petals, numerous stamens, and numerous carpels, which are compressed, one-seeded, and on a globose receptacle. They are aquatic plants, natives of very different climates, from the tropics to the cold regions of the world.—The COMMON A. (*S. variabilis*) is a beautiful aquatic, a native of America, with arrow-shaped leaves which rise above the surface of the water. It is one of those plants which have enjoyed an undeserved reputation as cures for hydrophobia. The corms (or solid bulbs), dried and powdered, have sometimes been used for food, but have an acrid unpleasant taste.—The CHINESE A. (*S. sinensis*) is a native of China, and has long been cultivated in that country and Japan for its eatable corms, which, in a fresh state, are somewhat acrid, but abound in starch. It has arrow-shaped acute leaves, and a branched polygonal scape (leafless stem). It is grown in ditches and ponds.

ARROW-HEADED CHARACTERS. See CUNEIFORM.

ARROW-HEADS. See ELF-ARROW-HEADS.

ARROW-ROOT is a variety of starch extracted from the roots of certain plants growing in tropical countries. It is a fine starchy farina, much valued as a delicacy, and as an easily digestible food for children and invalids. It is obtained from the tuberous roots—or more correctly, the root-stocks (*rhizomes*)—of different species of the genus *maranta*, belonging to the natural order *marantaceæ*, and characterized by solitary ovules, a fleshy style curved downwards, branching stems, and white flowers. The species chiefly yielding it is *M. arundinacea*, a native of tropical America, cultivated in the West India islands, and growing about 2 ft. high, with ovato-lanceolate somewhat hairy leaves, clusters of small flowers on 2-flowered stalks, and globular fruit about the size of currants. The roots (or rhizomes) contain a large proportion of farina. They are often more than a foot long, of the thickness of a finger, jointed, and almost white, covered with pretty large paper-like scales. They sometimes curve so that the points rise out of the earth, and form new plants. They are dug up when a year old, washed, carefully peeled, and reduced to a milky pulp. Mills for this purpose have been introduced, but in Jamaica the roots are usually reduced by beating in deep wooden mortars; in Bermuda by means of a wheel-rasp. The pulp is then mixed with much water, cleared of fibers, by means of a sieve of coarse cloth or hair, and the starch is allowed to settle to the bottom. The water dissolves, and so removes the greater part of the albumen and salts, the starch quickly settling down as an insoluble powder. Successive washings are employed for further purification. The A. is finally dried in the sun or in drying-houses, great care being taken, by means of gauze, to exclude dust and insects. The careful peeling of the roots is of great importance, as the skin contains a resinous matter, which imparts a disagreeable flavor to A. with which it is allowed to mix. Great care is taken to preserve the A. from impurities; and the knives used in peeling the roots, and the shovels used in lifting the A., are made of German silver. The West Indian A., most esteemed in the market, is grown in Bermuda; the next, and almost equal to it, in Jamaica. The East Indian A. is not in general so highly valued, perhaps because substitutes for the genuine A. more frequently receive that name. The *maranta arundinacea* is now, however, cultivated to some extent both in the East Indies and in Africa. *M. indica*, which was supposed to be distinct from *M. arundinacea*, is now regarded as a mere variety of it, with perfectly smooth leaves. It is cultivated both in the East Indies and in Jamaica. A. is obtained also from *M. allouya* and *M. nobilis* in the West Indies, and from *M. ramosissima* in the East.

The amount of fecula or starch present in the roots of the *maranta* varies according to age, and runs from 8 per cent, in those of the young plant, to 26 per cent when full grown. The latter stage is reached when the plant is 10 to 12 months old; and the roots then present the following composition in 100 parts:

Starch, fecula, or arrow-root.....	26
Woody fiber.....	6
Albumen.....	1½
Gummy extract, volatile oil, and salts.....	1
Water.....	65½

A. is exported in tin cases, barrels, or boxes, carefully closed up. It is a light, opaque, white powder, which, when rubbed between the fingers, produces a slight crackling noise, like that heard when newly fallen snow is being made into a snow-ball. Through the microscope, the particles are seen to be convex, more or less elliptical, sometimes obscurely triangular, and not very different in size. The dry farina is quite inodorous, but when dissolved in boiling water it has a slight peculiar smell, and swells up into a very perfect jelly. Potato-starch, with which it is often adulterated, may be distinguished by the greater size of its particles, their coarser and more distinct rings, and their more glistening appearance. Refined sago-flour is used for adulteration, many of the particles of which have a truncated extremity, and their surface is irregular or tuberculated. A. is also sometimes adulterated with rice-starch and with the common starch of wheat-flour.

Not less than 800,000 lbs. of A. are annually imported into the British isles. As an article of diet, it is often prepared for invalids and children by merely dissolving it in boiling-water and flavoring with sugar, lemon-juice, wine, etc. It is also often prepared with milk, made into puddings, etc. When most simply prepared, it forms a light meal, which, however, is not very nutritious. See NUTRITION.

A farina somewhat similar to A., and partly known by the distinct name of *tous-les-mois*, is obtained from some species of the allied genus *canna* (q.v.). But East Indian A. is in part obtained from the tubers of *curcuma angustifolia*. Other species of *curcuma* (see TURMERIC), as *C. zerumbet*, *C. leucorhiza*, and *C. rubescens*, also yield a similar farina; the same tubers which, when young, yield a beautiful and pure starch, yielding turmeric when old. In Travancore, this starch is a principal part of the food of the inhabitants. The young tubers of the galangale (q.v.), (*alpinia galanga*), another plant of the same natural order (*scitamineæ*), are another source of this farina.—A farina somewhat resembling A., and often sold under that name, is obtained from different species of the natural order *cycadaceæ*, as from the dwarf fleshy trunks of *zamia tenuis*, *Z. furfuracea*, and *Z. pumila* in the West Indies, and from the large seeds of *dion edule* in the lowlands of Mexico.—The starch of the cassava, manihot or manioc (see MANIOC), is sometimes imported into Europe under the name of Brazilian A. Potato-starch, carefully prepared, is sometimes sold as English A.; and the farina obtained from the roots of the *arum maculatum* (see ARUM), as Portland A. Otaheite A. is the starch of *tacca* (q.v.) *pinnatifida*.—All these, as well as Oswego and Chicago corn-flour—the starch of maize or Indian corn—are so nearly allied to true A. as not to be certainly distinguishable by chemical tests; but the forms of the granules differ, so that they can be distinguished by the microscope.

The name A. is commonly said to have had its origin from the use of the fresh roots by the South American Indians as an application to wounds to counteract the effects of poisoned arrows; and the expressed juice has been recently recommended as an antidote to poisons, and a cure for the stings and bites of venomous insects and reptiles. But it is not improbable that the name is really another form of *ara*, the Indian name.

ARROWSMITH, the name of a family of English geographers. AARON, b. about 1750, in Durham, earned fame by his large chart of the world on Mercator's projection, and another on the globular projection. He d. in 1823, leaving two sons, AARON and SAMUEL; the former compiled the *Eton Comparative Atlas*, a biblical atlas, and geographical manuals. John A., nephew of the elder Aaron, published his *London Atlas* in 1834, following it with many other elaborate works in cartography. He was one of the founders of the royal geographical society. He d. May 2, 1873.

ARROYO MOLINOS, a village in Estremadura, Spain, noted as the scene of gen. Girard's complete discomfiture by lord Hill on the 28th Oct., 1811. Gen. Girard had been sent out by Soult on a plundering foray with 5000 men, when he was surprised early in the morning by lord Hill, who had slept a league off at Alcuéscar; the natives of which had the good sense not to betray the presence of their deliverers. With a couple of regiments, the 71st and 92d, the English general dashed through the rain upon the enemy, who fled in all directions, leaving behind everything, arms, packs, etc. 1300 prisoners were taken; the whole artillery, colors, baggage, etc. French historians (Thiers, etc.), however, maintain that the battle was "undecided," and that their countrymen only retreated in good order, under the pressure of much larger forces.

ARRU' ISLANDS, a Dutch possession, s. of New Guinea, between 5° and 7° s. lat., and 134° and 135° e. long.; area, 3000 sq. m.; pop. about 25,000, including a small number of Christians and Mohammedans. The natives, who are fetich-worshippers, approach the Papuan type, and the islands are thought to have formed originally a part of New Guinea. Sago and cocoanut palms are plentiful, and some tobacco, rice, sugar-cane, maize, and edible roots, etc., are cultivated. The forests yield timber, and the sea fish. The rocks give edible nests, and the woods shelter wild swine, hares, parrots, pigeons, birds of paradise, etc. Cotton goods, iron and copper wares, Chinese pottery, beads, knives, rum, and arrack are imported, and bartered for mother-of-pearl, trepang, edible nests, pearls, tortoise-shell, birds of paradise, etc.

ARSA'CES, a name common to several Parthian and Armenian kings. The accounts concerning them which have been transmitted to us by the ancient historians are exceedingly vague, confused, and contradictory; and modern criticism has found itself unable

to reconcile or simplify the conflicting statements. The most important members of the dynasty of the Scythian Arsacidae were A. I. and A. VI.

ARSACES I., the founder of the Parthian monarchy, flourished in the 3d c. B. C., under the reign of Antiochus-Theus. An atrocious insult offered to his brother Tiridates by Pherecles or Agathocles, Macedonian satrap of the country, is said to have fired his spirit, and driven him to rebel. The Macedonians were expelled, 256 B. C. Antiochus, embroiled in a war with Egypt, could not immediately find time to attempt the recovery of this portion of his dominions. Seleucus, the son of Antiochus, made two unsuccessful expeditions against the insurgent chief, in the last of which he was taken prisoner. A. I. now acquired regal power, built a city called Dara, on the mountain Zaportenen, developed the internal resources of his new kingdom, and endeavored to organize it; and, after the conquest of several countries, d. at a great age. Such, at least, is the account given by Posidonius, etc.; but Arrian states that A. d. after a reign of two years, and that his brother Tiridates succeeded him, under the name of A. II., and ruled for thirty-seven years, whence we may conclude that many of the acts attributed to the founder of the Parthian kingdom were the work of his successor.

ARSACES VI., or **MITHRIDATES I.**, flourished about the middle of the 2d c. B. C. He enlarged the territories of the Parthians by the conquest of Bactria; and is even supposed to have penetrated into India, and subdued the nations between the Hydaspes and Indus. In the year 138 B. C., he defeated and took prisoner Demetrius Nicator, king of Syria, whom, however, he treated generously, bestowing on him his daughter in marriage. He was a just and merciful prince, and an enemy to luxury.

ARSAMASS', or **ARZAMAS**, a t. in Russia, at the confluence of the Arsha and Teska, affluents of the Volga; pop. about 10,400. It is a manufacturing place, and has annual fairs. A. contains churches and monasteries.

ARSENALS are great military and naval repositories where the munitions of war are manufactured and stored for use. In France the chief arsenals are Cherbourg, Brest and Toulon. Kiel in Germany and Spezia in Italy are the principal ones in those countries. In England there are munitions stored at Deptford, Weedon, the Tower, and other places, but the great arsenal of the country is at Woolwich. This arsenal is divided into two great sections, of which one is the depot for the storage of arms and all military equipments, whether for land or naval service, the other being occupied by the manufacturing departments, containing the gun-factories and the laboratory.

In the United States armories and arsenals were not established until after the revolutionary war, but powder was made in Virginia in 1776. In 1777 General Washington chose Springfield as a suitable location for an arsenal, and small arms were made there in 1787; about the same time an armory was built at Carlisle, Pa. The arsenal at Harper's Ferry was begun in 1795, and from that time the number was gradually increased until, in 1860, there were 23 scattered quite generally among the different states. Of this number 9 were enlarged during the civil war, the small arm establishment at Springfield alone having a capacity of 1000 muskets per day. The following are the armories, arsenals, and depots now used for various army purposes: Allegheny, Pa.; Augusta, Ga.; Benicia, Cal.; Cheyenne, Wyo.; Columbia, Tenn.; Fort Leavenworth, Kan.; Fort Monroe, Va.; Fort Snelling, Minn.; Frankford, Pa.; Indianapolis, Ind.; Augusta, Me.; Springfield, Mass.; Governor's Island, N. Y.; Rock Island, Ill.; St. Louis, Mo.; San Antonio, Tex.; Dover, N. J.; Vancouver, Wash.; Watertown, Mass.; Watervliet, N. Y. At Frankford arsenal small-arm ammunition is made in large quantities, at Watertown gun-fabrication and testing have been carried on. Sea-coast carriages and projectiles for heavy guns are also made in considerable quantities. At Springfield the manufacture of small arms is the chief employment. At Rock Island and Benicia considerable leather work is made. There is also an ordnance depot at Omaha, Neb.

Several years ago a mixed board of army and naval officers made a thorough investigation of public and private gun foundries and arsenals both in this country and abroad, and their conclusions were that the demands of the services that they represented could best be fulfilled by establishing a separate arsenal for each branch, where the fabrication of guns could be carried on, as well as all that pertained to ordnance. The arsenal at Watervliet, New York, was selected for army use, and after the completion of the buildings a plant was installed for heavy gun manufacture. It was not deemed advisable to have the forgings made by the government, so for this purpose contracts involving millions of dollars have been made with various firms, but chiefly with the iron works at Bethlehem, Pa. Rock Island and Benicia have also been equipped as additional arsenals, where the manufacture and assembling of the guns are carried on. The naval officers selected the navy-yard at Washington, D. C., as the most desirable locality for making naval guns, and at once set to work to remodel the yard for the improved system of gun-making. The changes have been entirely completed, and almost all of the batteries of the new cruisers are made up of guns finished at the naval arsenal. These guns embrace all calibres, from the 3-inch howitzer to the 10-inch gun, and preparations are in progress for making guns of 13 inches calibre, which is the largest size at present proposed for naval use. Rapid fire artillery, carriages, mountings and projectiles for the different classes of guns in use in the navy are also made here in such quantities as are required.

ARSENIC is the name applied in popular language to a well-known poisonous substance, arsenious acid (q.v.), but, strictly speaking, the term is restricted to the metal, of which the symbol is As and the equivalent is 75.0. The metal A. is rarely found free in nature, but in a state of combination it occurs largely (see **ARSENICAL MINERALS**). The metal is generally prepared from arsenious acid, As_2O_3 , by mixing it with its own weight of charcoal, placing the mixture in a well-covered crucible, and subjecting the whole to heat, when the metal set free by the charcoal rises, and condenses in the upper part or cover of the crucible. Metallic A. is very brittle, can easily be reduced to powder by hammering, or even pounding in a mortar; and when a freshly-cut surface is examined, it presents a brilliant dark steel-gray lustre, which, however, readily tarnishes on exposure to the air. The metal, as such, is not considered poisonous, but when introduced into the animal system, it is there faintly acted upon by the juices, and in part dissolved, at the same time exhibiting poisonous properties. When heated in the open air, it burns with a peculiar bluish flame, and emits a characteristic alliaceous odor. The only use to which the metal A. is applied in the arts is in the manufacture of leaden shot of the various sizes, when its presence in small quantity in the lead renders the latter much more brittle than it ordinarily is. Of all the compounds of A. the most important is the one already alluded to—viz., arsenious acid, which is an oxide of A. With sulphur, A. forms two important compounds: *realgar*, As_2S_2 , a red, transparent, and brittle substance, which is employed in the manufacture of the signal-light called *white Indian fire*; and *orpiment*, As_2S_3 , or *king's yellow*, a cheap pigment of a yellow color. With hydrogen, A. forms arseniuretted hydrogen, AsH_3 , a very poisonous gas, and one which has been fatal to several chemists.

ARSENICAL MINERALS occur chiefly in primitive rocks, and frequently associated with other metalliferous minerals.—*Native arsenic*, although nowhere very abundant, is not unfrequently found in mines in Europe, Asia, and America, generally along with sulphur and metallic sulphurets. In Britain, it occurs at Tyndrum in Perthshire. It has usually a fine granular character. It is very seldom, if ever, quite pure, usually containing a little antimony and iron, and not unfrequently a very little silver or gold.—A very similar, and still rarer mineral, found in similar situations, is known as *arsenic-antimony*, and consists of about two parts of metallic arsenic, and one of metallic antimony.—*Arsenic-silver*, or *arsenical silver*, is another very rare mineral, consisting chiefly of arsenic and iron, but containing also about 13 per cent of silver and a little antimony.—*Arsenic-glance*, found at Marienberg in Saxony, and containing about 3 per cent of bismuth, has the remarkable property of taking fire at the flame of a candle.—*Arsenious acid* occurs native in a few localities in Germany and France, and as a mineral species, has received the name of *arsenite*, which perhaps too closely resembles the chemical designation of its salts.—*Arsenic acid*, another compound of arsenic and oxygen (As_2O_5), containing more oxygen than arsenious acid, although it does not itself occur native, is not unfrequent in the form of compounds with copper and lead (*arseniates* of copper and lead), which enter into the composition of a number of minerals, none of them so abundant as to be important.—Among A. M. are also to be ranked the compounds of arsenic with sulphur, particularly *orpiment* (see **ARSENIC**), *realgar* (q.v.), and *dimorphine*, a rarer mineral than the other two, and therefore less important.—But the most important of all A. M., because of their use as ores of arsenic, for the preparation of white arsenic, or arsenious acid, are those in which arsenic is combined with nickel and cobalt. One of these is *arsenical pyrites*, or *leucopyrite*, found in various mines of the continent of Europe, and containing arsenic, iron, sulphur, nickel, and cobalt, in somewhat various proportions—the arsenic, however, always the principal constituent. It generally occurs massive.—*Mispickel*, which frequently occurs in rhombic crystals, but often also massive, differs from it in containing a considerable quantity of silver, so that it is used both as an ore of arsenic and of silver. It is found in many of the tin-mines of Cornwall, and is pretty frequent in different parts of the world.—*Nickeline* consists of nickel and arsenic, and is used as an ore of nickel, and also for the preparation of white arsenic.—*Cobaltine* and *smaltine*—the former consisting of cobalt, sulphur, and arsenic; the latter, of cobalt and arsenic—are used for the preparation of blue colors for porcelain and stoneware. Both are found in Cornwall; they occur also in some of the mines of the continent of Europe, and in other parts of the world.—The presence of arsenic in a mineral may commonly be detected by the alliaceous odor which it emits before the blowpipe.

ARSENIC POISONING. See **POISONS**.

ARSENIOUS ACID is the arsenical compound most familiarly known. It is obtained principally during the roasting of the arsenical nickel ores in Germany in furnaces communicating with flues. When the arsenic of the ore burns, it passes into the condition of A. A., As_2O_3 , and rising as vapor into the somewhat cool flue, is there deposited as a grayish powder, known by the names of *smelting-house smoke*, *flowers of arsenic*, *poison-flour*, or *rough A. A.* In this condition, the A. A. is contaminated with some impurities, from which it may be separated by introducing the gray powder into an egg-shaped vessel, and applying heat at the lower end, when the A. A. rises in vapor, and condenses in the cool end as a transparent glassy or vitreous substance. Ordinary A. A. of the

shops (which is what is popularly known as *arsenic*) is a white crystalline powder, which feels decidedly gritty, like fine sand, when placed between the teeth, and has no well-marked taste. It is very heavy, so much so as at once to be noticeable when a paper or bottle containing it is lifted by the hand. It is soluble in water to the extent of 1 part of A. A. in about 100 parts of cold water, and 1 part of A. A. in about 10 parts of boiling water. In England, if sold in quantities under 10 lbs. in weight, the A. A. is required by law to be colored with $\frac{1}{32}$ of its weight of indigo, or $\frac{1}{16}$ of its weight of soot; the object of the admixture being to render any liquid to which the A. A. might be added, with a murderous intent, of a black or bluish-black hue, and thus indicate the presence of something unusual. In packages of 10 lbs. and upwards, A. A. is allowed to be sold in the pure white crystalline form without coloration. When placed in a spoon, or other vessel, and heated, the A. A. volatilizes, and condenses in crystals on any cool vessel held above. By this means, it can be distinguished from ordinary flour, which, when heated, would char, and leave a coal behind; and from chalk, stucco, baking-soda, tooth-powder, and other white substances, which, when heated, remain in the vessel as a non-volatile white residue. Again, when A. A. is placed on a red-hot cinder, and the escaping vapors cautiously brought under the nostrils, the strong alliaceous odor characteristic of arsenic is given off. The mode in which A. A. comports itself, when thrown upon water, is likewise peculiar. Instead of at once descending through the water like sand, the A. A., notwithstanding its great density (sp. gr. 3.70), partially floats on the surface, as wheat-flour does; and that portion which sinks in the water, rolls itself into little round pellets, which are wetted only on the outside, and contain much dry A. A. within. The solution of A. A. in water is recognized by three tests:

1. Hydrosulphuric acid and hydrochloric acid produce a *yellow precipitate* of sulphide of arsenic, As_2S_3 , soluble in ammonia.

2. Ammonio-sulphate of copper, an *apple-green precipitate* of arsenite of copper, $CuHAsO_3$.

3. Ammonio-nitrate of silver, a *yellow precipitate* of arsenite of silver, As_3AsO_3 .

In many cases A. A. is used as a means of destroying animal life, but happily, the processes for the detection of the poison in organic mixtures and in the animal tissues are so unerring and trustworthy, that it is hardly within the range of possibility that an animal can be destroyed by the administration of A. A. without very decided evidence of the existence of the poison being obtained on examination of the various parts of the animal structure; indeed, it may be safely said that there is no limit to the detection of the poison, as even after the animal structure has been so far decomposed that little remains, yet still the poison, from its indestructibility, survives, and will indicate itself clearly, on the application of the several tests.

For the isolation and recognition of A. A. in organic mixtures, such as the contents of a stomach, three processes may be followed. The method generally pursued, and that upon which greatest dependence is placed, is called Reinsch's process, from the name of its discoverer. The manner of its application is to treat the organic mixture with water sufficient to render it thin, then add hydrochloric acid to the extent of one eighth of the volume of the liquid; apply heat, and when the whole has been raised to near the boiling-point, introduce clean, newly burnished pieces of copper in the form of wire, gauze, or foil. If A. A. be present in the mixture, a steel-gray coating of metallic arsenic will form on the surface of the copper. This apparent tarnishing of the copper may take place when no A. A. is in the mixture, and may be produced by salts of mercury, antimony, etc., as well as by sulphur compounds, and even occasionally by fatty matters. To distinguish between the coating formed by A. A. and that produced by other substances, the copper is taken out of the mixture, washed with water, to remove acid; immersed in ether, to dissolve off any adherent fatty matter; dried between folds of blotting-paper; introduced into the lower end of a dry glass test-tube, and there cautiously heated. The metallic arsenic, As , is driven off by the heat from the surface of the copper, rises in vapor into the upper portions of the test-tube; there meets the oxygen of the air, with which it combines, forming A. A., As_2O_3 , and thereafter deposits itself on the inner surface of the cool part of the tube in little glistening crystals. On allowing the tube to cool, adding water thereto, and applying heat, the water dissolves the crystals of A. A., yielding a solution, to separate portions of which the liquid tests mentioned above may be successfully applied. This process may likewise be employed in the detection of A. A. in animal tissue, as in the liver, spleen, kidneys, etc., by first dividing the animal matter into small pieces, and thereafter treating with water, hydrochloric acid, and copper. The precautions which require to be exercised in trying this process are, that the hydrochloric acid and copper are themselves free from A. A. Hydrochloric acid has long been known to be liable to contain at times a very sensible proportion of the poison, and it is therefore necessary, before using the acid in any experiment, to make a preliminary trial with dilute hydrochloric acid, into which, when heated, a piece of copper is immersed; and if no tarnishing occurs after a quarter of an hour's trial, the acid may be declared free from contamination with arsenical compounds. The liability of copper to contain arsenic some years ago (Aug., 1859) assumed importance in connection with a trial for murder by slow poisoning with arsenic, which took place in Britain. In this case, a considerable amount of copper was dissolved during the testing, and supplied the

poison in quantity enough to produce a faint coating on a piece of copper which was subsequently introduced into the liquid. The result was that A. A. was at first declared to be present in the material under examination; but further experiments demonstrated that the copper itself had afforded the arsenic. To free copper from any arsenic which it may contain originally, it is only necessary to heat the copper over a gas or spirit-lamp flame, when the arsenic volatilizes, and leaves the copper uncontaminated therewith.

The other two processes for the detection of A. A. in organic mixtures are—1. That recommended by Marsh, in which the material is treated with dilute sulphuric acid and metallic zinc in a gas-generating apparatus, when the arsenic combining with hydrogen, forms arseniuretted hydrogen (AsH_3), from which, in the act of escaping, the metallic arsenic, and subsequently A. A., can be obtained; and 2. That known as Berzelius's process, in which dry arsenical compounds are mixed with the reducing flux, and heated in a constricted tube, when the metal arsenic is produced, which in its turn is converted into A. A. by heating in a wide test-tube. The processes of Marsh and Berzelius are not so generally followed as that of Reinsch; but in each and all it is absolutely necessary, in order to avoid the possibility of mistake, (1) that metallic arsenic be obtained from the organic mixture; (2) that the metallic arsenic be converted into A. A.; and (3) that this A. A., treated with water, should yield a solution which will give the three liquid tests mentioned previously.

A. A. forms compounds (salts) with alkalies and other bases, which are called arsenites. Some of these are employed in commerce and medicine. A. A., boiled with a solution of potash, or carbonate of potash, forms an arsenite of potash, used in medicine, and known as *Fowler's solution*. The more largely used sheep-dipping mixtures are composed of A. A., soda, sulphur, and soap, which, when used, are dissolved in a large quantity of water, and thus constitute essentially dilute solutions of arsenite of soda. A compound of A. A. and the oxide of copper, called the arsenite of copper, or *Scheele's green*, is a pigment largely used by painters as a pretty and cheap green paint. The same substance is extensively employed in the manufacture of common green paper-hangings for the walls of rooms; and recent inquiries would lead to the belief that rooms covered with paper coated with this green arsenite of copper, are detrimental to the health of human beings residing therein, from the readiness with which minute particles of the poisonous pigment are detached from the walls by the slightest friction, are diffused through the room, and ultimately pass into the animal system. Another green pigment is named *Schweinfurth green*, and contains A. A., oxide of copper, and acetic acid, and is a double arsenite and acetate of copper.

ARSENIC (ARSENIOUS ACID), *Properties of, as a Drug*.—A. has long been used as a medicine. When taken into the stomach, it is soon absorbed into the blood, and circulates with that fluid, exhibiting great power over certain diseases, especially skin diseases, as psoriasis, lepra, eczema (q.v.), etc. It is also classed among the tonic minerals, and given for nervous disorders, especially those that are periodic. Of late it has been much recommended for rheumatism; and Dr. Begbie, of Edinburgh, considered that among the remedies for chorea (St. Vitus' dance) it holds the foremost place. In ague, also, and remittent fever, as well as in other disorders originating from the same source, A. and quinine are our chief remedies. They are considered to act as alteratives of the blood. The usual method of administering A. is in small doses (from 3 to 5 drops) of the liquor arsenicalis, largely diluted with water, twice or thrice in the day. Arsenic is sometimes given combined with iodine and mercury (Donovan's solution).

When given in the doses above mentioned, for 8 or 10 days, symptoms of poisoning begin to appear; the skin becomes hot, the pulse quick, the eyelids hot and itchy; the tongue has a silvery appearance; the throat is dry and sore, the gums swollen and tender; and if the treatment is persisted in, salivation ensues, and then come nausea, vomiting, diarrhœa, nervous depression, and faintness (Begbie). The quantity necessary to destroy life, of course, varies. Dr. Christison records the case of a man who died in six days, after taking 30 grains of the powdered white A.; but a much smaller dose will prove fatal; a girl was killed with $2\frac{1}{2}$ grains of A. contained in 2 ozs. of fly-water. According to Dr. Swaine Taylor, a medical witness is justified in stating, that under circumstances favorable for its operation the fatal dose for an adult is from *two to three grains*. Death from a poisonous dose of A. may occur in a few hours, or after the lapse of days. A woman, aged 56, used a solution of A. in water to cure the itch; she experienced severe suffering, and died after two years, having had symptoms of arsenical poisoning all that time.

A. has been used frequently as a slow poison, the symptoms being attributed to inflammation of the bowels from natural causes. Fortunately, in most cases its detection is easy. Orfila found A. in the soil of cemeteries, a fact which has created some discussion among toxicologists. A. is used by anatomists as an antiseptic, but is dangerous, as it is apt to get into cuts on the hands, and under the finger-nails, and cause disagreeable symptoms. It is stated that in some countries, especially in Styria, A. is taken by the young female peasants to increase their personal attractions; a statement which probably amounts to this, that experience of its tonic and other qualities induces some individuals to prescribe for themselves a medicine which ought only to be administered by a skillful and cautious hand. That A. can be taken habitually for any length of time, would seem a physiological impossibility; and yet such statements are made on what

appears to be unquestionable authority. See *Chambers's Journal*, vol. v. p. 90, and vi. p. 46; also Johnston's *Chemistry of Common Life*.

No effective chemical *antidote* for A. has yet been discovered. In case of an overdose, or of intentional poisoning, the following treatment is recommended: Evacuate the stomach by the stomach-pump, using lime-water; administer large draughts of tepid sugar and water, chalk and water, or lime-water; avoid the use of alkalies, but administer charcoal and hydrated sesquioxide of iron; bleed freely; take a tepid bath, and use narcotics. If the fatal symptoms be averted, let the patient for a long time subsist wholly on farinaceous food, milk, and demulcents.

ARSIN'OE, the daughter of Ptolemy I., king of Egypt, and of Berenice, was b. about 316 B.C., and married in her 16th year to the aged Lysimachus, king of Thrace, whose eldest son, Agathocles, had already wedded Lysandra, the half-sister of A. Desirous of securing the throne to her own children, A. prevailed on her husband to put Agathocles to death; the consequences of which crime, however, were fatal to the Thracian monarch; for Lysandra, having fled with her children to Seleucus in Asia, managed to induce him to declare war against her unnatural father-in-law. Lysimachus was slain, and Seleucus seized the kingdom. A. now sought refuge in Macedonia, which, however, was also taken possession of by Seleucus; but on the assassination of the latter, after a few months, by Ptolemy Ceraunus, the half-brother of A., she received a hypocritical offer of marriage from Ptolemy, who wanted to destroy her two sons, lest they should prove formidable rivals to his ambition. She consented to the union, and opened the gates of the town in which she had taken refuge, but her children were butchered before her eyes. She then fled to Egypt (279 B.C.), where she married her own brother, Ptolemy II. Philadelphus. These unnatural unions subsequently became common among the Greek kings of Egypt. It does not appear that A. had any children by her brother, though she was regarded by him with the deepest affection. He named several cities, and also an entire district, by her name. After her death, he ordered Dиноchares, the architect, to build a temple to her memory, and roof the edifice with loadstones, so that her iron statue might seem to float in the air.

ARSIN'OE, daughter of Ptolemy Auletes, of Egypt. She escaped from Alexandria when that city was besieged by Cæsar, 47 B.C., and was received as queen by the Egyptians, her brother Ptolemy Dionysius being in Cæsar's hands. The city was taken, and A. was one of the captives led in triumph through the streets of Rome, where the people expressed great sympathy for her. She was liberated by Cæsar and returned to Egypt, but her sister Cleopatra persuaded Antony to have her put to death, 41 B.C., although she had taken refuge in the temple of Diana.

AR'SIS AND THE'SIS (Gr. raising up, and laying down), a term in music applied to the rising and falling of the hand in beating time. It is also applied to the elevation and depression of the voice in speaking.

ARSON, or, as it is called in Scotland, *willful fire-raising*, is, according to the laws of all civilized countries, a crime of the deepest atrocity; for it involves in its consequences not only destruction of property; but also the destruction of, or at least an indifference to, the life or lives of others, which can only be imputed to the most wicked and malignant spirit. In the criminal law of England, it is a felony, and has been described as the malicious and willful burning of the house or building of another man. It is essential to the offense that the house or building burned should be that of *another*; for although it is a misdemeanor to destroy one's own house by fire, especially in a town, or where other buildings are contiguous, which are thereby put in danger, such an offense does not amount to a felony, strictly so called. To constitute such felony, there must be an *actual* burning; for no intent, however clear, would suffice at common law to support a charge of arson.

By the law of many of our states, the crime of arson is substantially the same as in England. It varies from the common law, however. In some cases it is held to include the setting fire to one's own house. This is so in New York, where the setting fire to any building in which there is at the time a human being constitutes the crime of arson. The rule is also extended to the firing of an outbuilding so situated that its burning will manifestly endanger the building itself. The English law, which embraces haystacks and vegetable produce, would not be applied here as constituting the crime of arson.

It has been held that there need not be a blaze; any wasting of the fibres of the wood by the combustion is sufficient; and if the fire is extinguished, that makes no difference.

ART. The word A. is here meant as designating what is more specifically termed *fine A.*, being opposed to the useful arts, or the industrial operations for supplying the common necessities of life. Painting and poetry are fine arts; agriculture, navigation, and medicine are useful arts.

The great end of A. is to give pleasure, but the kind of pleasure is peculiar and circumscribed. There are many of our enjoyments that no artist would ever think of attempting to provide. The gratifications of eating and drinking, of exercise and repose, warmth and coolness, form a class in contrast with the pleasures of music, sculpture, or the drama. It is a matter of some nicety to draw the line between these two regions of our pleasurable susceptibility; indeed, it is not clear that a precise line can be

drawn. Certain peculiarities can be assigned as disqualifying circumstances, such that any mode of pleasure laboring under them is debarred from entering into A.; but after we have allowed for these, there will remain a disputed border-land, on which no general criterion will hold.

The various indulgences called sensual are the best examples of contrast to the pleasures of A. In the first place, as our frame is constituted, these bodily functions, while incidentally ministering to our pleasure, are in the main subservient to maintaining our existence, and being in the first instance guided for that special end, they do not necessarily rank among our gratifications as such; in the second place, they are connected with the production of what is repulsive and loathsome, which mars their purity as sources of pleasure; and in the third place, they are essentially confined in their influence to the single individual; for the sociability of the table is an element superadded. Now, a mode of pleasure subject to one or more of these three conditions may belong in an eminent degree to the list of utilities, and constitute an end of industry, but does not come under the class we are now considering. Wealth is disqualified by the third condition, inasmuch as, while in the shape of money, it is confined to some single proprietor. The same may be said of the pleasures of power and dignity. Even affection is too exclusive to come under the artistic head. Anything so restricted in its sphere of action as to constitute individual property, and give occasion to envy and jealousy, is not a pleasure aimed at by the producer of fine A.; for there do exist objects that can give us delight as their primary end, that have no disagreeable or revolting accompaniments, and whose enjoyment is not restricted to a single mind; all which considerations obviously elevate the rank of such objects in the scale of our enjoyments. The landscape, the glowing sunset, the song of the lark, the flowers of the field and the garden, yield unalloyed pleasure, and create no monopoly. The painter, sculptor, and musician aim at corresponding effects.

The eye and the ear are the chief avenues of artistic delight; the other senses are more or less in the monopolist interest. Moreover, one important feature in the somewhat capricious attribute termed *refinement*, attaches more particularly to the objects of these two senses; namely, the power of protracted enjoyment without fatigue. A *coarse* effect is one that is intense and pungent, but too exhausting to be kept up; such is a noisy clash of loud instruments in a musical performance, or a tale of overdone marvels. To remove all the fatiguing accompaniments, and thereby tone down the exciting influence, while retaining as much as possible the really pleasurable part, is to refine upon the effect, and produce a higher work of art. Now, in the sensations of taste and smell generally, the stimulus is apt to be of short duration; the pleasure is said to pall soon. Yet there are degrees in the case; some of the choicer odors can affect us for hours together with a gentle and pleasing sensation. But it is the ear, and perhaps still more the eye, that can remain open to agreeable stimulation for the greatest length of time; and taking this fact along with the unconsuming nature of their objects, we see good reasons for the artist striving so earnestly towards the gratification of those two senses.

The sensual elements can be brought into A. by being contemplated in the *idea*, in place of being enjoyed in the reality. A painter or poet may depict a feast to our minds, and impart a pleasure that differs essentially from the delights of eating and drinking. The imagined repast has nothing to do with our bodily necessities; the disagreeable accompaniments can be kept out of view; and any number of persons may share in the effect. So with the elements of wealth, power, dignity, and affection, which in their actuality want the liberal character of the true artistic delight; if we can only derive pleasure from the spectacle of them in the hands of the select number of their possessors, they become to us an enjoyment that can be shared by the general multitude, like the blue sky, or the towering peak. It is the fact that mankind find a charm in contemplating the wealthy, the powerful, the elevated, the illustrious, the beloved; and accordingly such elements are freely adopted into artistic compositions.

If all the sensual gratifications could become artistic by being contemplated in *idea*, or merely thought of, as in the above case of imagining a rich feast, we should have the means of distinctly circumscribing the select region of the beautiful or artistic, and of resolving a difficult problem. It would be admissible for the poet or painter to suggest any of those inferior pleasures to the mind by descriptive touches, and he would thereby elevate them into the region of art. But we find that every mode of sensual gratification is not open to this ideal presentation. Even as regards eating and drinking, exception is taken against the too free allusion to those pleasures; while the sensuality of love is hardly to be suggested through the most distant allusion. We may revel in tales of mere tender emotion—of parental love and of pure affection—but those other subjects are kept at the utmost distance; and we should be said to be reveling in sensuality, if we were merely to indulge in the imagination of those species of delight. There is no help, therefore, but to consider that there are *conventional* and arbitrary limitations of the sphere of the artist, rendering it quite impossible to draw any clear and universal boundary-line between the beautiful and the agreeable generally.

Sublimity, beauty, grace, harmony, melody, pathos, ideality, picturesqueness, proportion, order, fitness, keeping, and the ludicrous, though they do not all relate to the so-called *beautiful*, are all involved in the circle of pleasures now before us; and it is quite obvious that no one fact can run through this variety of designations. There must

be a great multitude of agents operating to produce these different impressions, which are related to one another only by attacking in common to the æsthetic class of compositions. Doubtless, several of these names may be employed to mean the same thing, being, in fact, partially synonymous terms, as beauty and grace—proportion, fitness, and keeping; but hardly any two terms are synonymous throughout, and there are distinct conceptions implied in sublimity, beauty, picturesqueness, fitness, and the ludicrous.

Among the elementary sensations and emotions of the human mind that are of a pleasurable kind, a certain number may enter at once into the composition of A.; such are the pleasures of sound and sight, the emotion of surprise, and plot-interest. Others may enter by ideal presentation; as the gratifications of the remaining senses, and the emotions of fear, tenderness, irascibility, power. The feelings more specific to A. are those produced by harmony under its various aspects. When sweet sounds are harmoniously combined, we have the musical art; the painter has a similar aim in reference to colors and forms; and so through all the fine arts, this quality is found recurring as the crowning work of the artistic hand. Nothing is so indisputably included within the circle of the æsthetic or beautiful as finely struck harmonies, melodies, or concords. Whatever else may be included in a composition, it is the admission of these that gives the specific charm, although it would be a mistake to dispense with other elements of interest common to art and to every-day life. Story is essential to romance and poetry; sweetness in the separate sounds is requisite for good music; and color in itself imparts æsthetic pleasure apart from harmonious union.

The agreeable effect designated by fitness takes rank with the artistic pleasures; we may call it the æsthetic of the useful. When a work is not only done effectually, but done with the appearance of ease, or the total absence of restraint, difficulty, and pain, we experience a delight quite different from the satisfaction growing out of the end attained. Much of the pleasure of architectural support is referable to this source.

Among the susceptibilities touched by artistic arrangements may be noticed the sense of unity in multitude, arising when a great number of things are brought under a comprehensive design, as when a row of pillars is crowned by a pediment. The use of simple figures—the triangle, circle, square, etc.—for inclosing and arranging a host of individuals, has the tendency to make an easily apprehended whole out of a numerous host of particulars. In all large works abounding in detail, we crave for some such comprehensive plan, whereby we may retain the total, while surveying the parts. A building, an oratorio, a poem, a history, a dissertation, a speech, should have a discernible principle of order throughout; the discernment of which gives an artistic pleasure, even in works of pure utility.

The craving for variety and novelty is a powerful impulse of the human mind, and makes itself especially apparent in the appreciation of works of A. The greatest works cease to please after a time, and temporary fashion may occasionally lord it over the perennial in taste.

In looking at the fine arts individually, we may divide them into two classes, by drawing a distinction of some importance as regards the question of an artistic *standard*. The one class contains the *effusive* arts, or those which consist of mere outbursts of the inward spontaneity, regulated by the effect of the display on the sense of the beholder or listener. Music is a good example. The spontaneous effusions of the human voice, and those prompted by the various emotions, are corrected and tuned by the ear into melody and harmony, and after this process has been often repeated, pleasing airs and compositions are the result. It is the same with the dance, considered as a fine art. In like manner, dramatic gesture and display, and the graces of elocution and fine address, are the natural promptings rendered pleasing by being changed and modified for that express end. The first movements are mere random, but the delicate sensibility of the beholder causes some to be suppressed, and others brought out, until a really pleasing combination is attained. Contrasted with the purely effusive, are the so-called *imitative* arts, or those that involve the representation of some of the appearances of the outer world. Such are painting, sculpture, and poetry. In these, the artist, while still aiming at pleasing effects, is trammelled with a new condition—namely, a certain amount of fidelity to his original. In the others, there are no originals. The musician imitates nothing, and is bound by the sole condition of gratifying the ear; but a painter chooses his subject from nature, and although he must contrive to yield the pleasures of color, outline, and grouping, he must do so with a certain respect to the object copied. The poet, in depicting the life of men, comes under the rule of fidelity to this extent, that an obvious misrepresentation is apt to give a painful shock, and mar the pleasure that would otherwise be derived from the poetry itself. It is not so much that truth is a part of the artistic pleasure, as that falsehood is a stumbling-block in the way; for even the imitative arts are only so in part. There is no imitation in the meter and cadence of a song, and yet these often constitute the main charm. So a certain license of fantastic effusion is allowed to poets, subject to no rules but the giving of pleasure. The creation of imaginary worlds, when avowed, is not objected to; and the criterion of fidelity to the actual is accordingly laid aside for the time. The various arts of decoration and design are for the most part effusive, although occasionally imitative. Architecture is not in any way imitative; the coincidence between the Gothic roof and the intermingling foliage of a double row of trees is a mere accident.

These observations are necessary in order to qualify the current maxim that nature is the artist's standard, and truth his chief end; conditions that, in their strictness, apply only to science. It is the scientific man that should never deviate from nature, and should care for truth above every other consideration. The artist's standard is *feeling*, his end is refined pleasure; he may go to nature, but it is to select what chimes in with his feelings of artistic effect, and pass by the rest. He is not bound to adhere to nature even in her choicest displays; his own taste being the touchstone, he alters the originals at his will. The student of science, on the other hand, must embrace every fact with open arms. If a nauseous fungus or loathsome rat meet the eye of a naturalist, he is bound to record it as faithfully and minutely as he would dilate on the violet or the nightingale. When a painter adopts the human figure as a basis for setting forth harmonies of color, beauties, and form, and picturesqueness of grouping, he ought not to jar our sense of consistency by a wide departure from the usual proportions of humanity. Still, we do not look for anatomical exactness; we know that the studies of an artist do not imply the knowledge of a professor of anatomy; but we expect the main features of the reality to be adhered to. In like manner, a poet is not great because he exhibits human nature with literal fidelity; to do that makes the reputation of a historian or mental philosopher. The poet works by his meters, his cadences, his touching smiles, his graceful narrative, and his exaltation of reality into the region of ideality; and if in all this he avoids serious mistakes and gross exaggerations, he succeeds in his real vocation.

The attempt to reconcile the artistic with the true—art with nature—has given birth to a peculiar school, in whose productions a restraint is put upon the flights of pure imagination, and which claims the merit of informing the mind as to the realities of the world, while gratifying the various emotions of taste. Instead of the tales of Fairyland, the Arabian Nights, and the Romances of Chivalry, we have the modern novelist, with his pictures of living men and manners. In painting, we have natural scenery, buildings, men, and animals represented with scrupulous exactness. The sculptor and the painter exercise the vocation of producing portraits that shall hand down to future ages the precise lineaments of the men and women of their generation; hence, the study of nature has become an element in artistic education; and the artist often speaks as if the exhibition of truth were his leading purpose. It is probably this endeavor to subject the imagination more strictly to the conditions of truth and reality, that has caused the singular inversion whereby the definition of science is made the definition of art.

But while fidelity, in the imitative class of arts, is to be looked upon, in the first instance, as avoiding a stumbling-block rather than constituting a charm, there are still certain ways wherein we derive from it a sort of pleasure that may be called æsthetic. We feel drawn by fellow-feeling towards one who has attended to the same objects as ourselves, or who has seized and put into vivid prominence what we have felt without ever having expressed. The coincidence of mind with mind is always productive of the agreeable effect of mutual sympathy, and, in some circumstances, there is an additional effect of pleasing surprise. Thus, when an artist not merely produces in his picture those features of the original that strike every one, but includes all the minuter objects that escape the notice of the generality, we sympathize with his attention, we admire his powers of observation, and become, as it were, his pupils, in extending our study and knowledge of nature and life. We feel a pungent surprise at discovering, for the first time, what has been long before our eyes; and so the minute school of artists labor at this species of effects. Moreover, we are brought forward as judges of the execution of a distinct purpose; we have to see whether he that is bent on imitation does his work well or ill; and if our verdict is favorable, our admiration is excited accordingly. There is, too, a certain exciting effect in the reproduction of some appearance in a foreign material, as when a plain surface is made to yield the impression of solid effect, and canvas or stone imitates living humanity. Finally, the sentiment of reality and truth, as opposed to fiction or falsehood, appealing to our practical urgencies, disposes us to assign a value to every work in which truth is strongly aimed at, and to derive an additional satisfaction when fidelity of rendering is induced upon the charms peculiar to A. Thus imitation—which, properly speaking is a mere accident attaching to sculpture, painting, and poetry, and has no place in music or architecture—may become the center of a small group of agreeable or acceptable effects. These effects are the more prized, that we have been surfeited with the purely æsthetic ideals. We turn refreshed from the middle-age romance to the graphic novel of our own time.

Besides being a source of pleasure, art is frequently spoken of as having an elevating and refining influence on the mind and character; for which reason it is considered a proper object of public encouragement in civilized communities. This circumstance is owing to the higher nature of artistic pleasure as above described, the taste for which helps to rescue mankind from the exclusive dominion of sensual and selfish enjoyments. At the same time, we must admit that the devotion to art may be itself excessive, and have the effect of withdrawing men too much from the urgency of practical life, rendering them a prey to political despotism, as well as indifferent to moral principles. Instances are not wanting to justify this remark.

See Dugald Stewart's *Philosophical Essays*, Part II., and Bain on the *Emotions and the Will*, p. 247. See *ÆSTHETICS*.

ART, HISTORY OF. The history of the origin and development, growth and decline of beautiful artistic forms, constitutes a portion of the history of civilization. As regards each particular people, the history of their efforts to conceive and express absolute perfection, or what is commonly called ideal beauty, in form and color, is, with the single exception of the history of their speculative opinions, the most reliable test of the stage of progress which they have attained. Nor is it as an indication of their command over physical nature, of the abundance of their external resources, or even of their intellectual activity alone, that the history of the art of a people is thus important. It determines their moral, and even, in a certain sense, their religious position, for the inseparable connection between the beautiful and the good is in no way more clearly manifested than in the fact that the first inroads of demoralization and social disorder are invariably indicated by a diminution in the strength and purity of artistic forms. It has been usual to include under the term history of art merely the history of the arts of form, including architecture, but excluding, of course, poetry and music, though these latter, again, are generally included when we speak of the fine arts. See **ART**; **PAINTING**.

The classical nations of antiquity were not insensible to the importance of tracing the development of that rich artistical life which they had originated, and we accordingly find the germs of artistic history in Pliny, Quintilian, Pausanias, and others. In the middle ages, every trace of a general historical treatment of art disappears, though casual remarks and incidental notices on the subject of artists and the arts are abundant, particularly in such works as the *Liber Pontificalis* of abbot Anastasius, who is commonly known as "the librarian," in consequence of his having filled that office at the Vatican in the 9th century. But a history of art, in the sense which we have here assigned to the term, made its appearance in the world for the first time on the revival of letters, in the 15th and 16th centuries; when the artistic treasures of the heathen world, which had come upon mankind as novelties, fell to be contrasted with that peculiar type which art had assumed under Christian influences during the middle ages, on the one hand (see **BYZANTINE ART**), and on the other with that rich harvest of fresh invention which ripened during the long lives of Leonardo da Vinci (q.v.) and Michael Angelo (q.v.), in the period of which Raphael's (q.v.) short career may be regarded as the noonday. Whilst Vasari (q.v.) traced the great epochs of Italian art—from a biographical point of view only, it is true—in his celebrated work, the students of classical literature collected such expressions of opinion on artistic subjects as the writings of the ancients contained, and Palladio, Ligorio, Vignola, and others measured ancient buildings and their constituent members. In this way a vast mass of information on artistic subjects was brought together. But though the materials which might have served for a history of art were thus supplied, it was a long time afterwards before anything like proper historical treatment arose; and the knowledge of ancient art which had been gained, was applied to their respective purposes by artists on the one hand and philologists on the other. As regarded modern art, the biographical method of Vasari was adhered to, and to this circumstance we are indebted for the innumerable artistic anecdotes which have been preserved. The remarkable variations in style which exhibited themselves between the 16th and 18th centuries, gave rise to a species of historical treatment which had for its object the discovery of the common features by which the artists of the respective periods were distinguished. But the history of style, strictly speaking, begins with Winckelmann (q.v.), who was the first to divide ancient art into epochs, and to trace its connection with the general history of human progress. It was from this period that the history of art came to be regarded as a branch of the history of civilization. Even where the biographical method continued to be followed, it was henceforth with this difference, that the division into schools took the place of mere chronological arrangement. The strongly classical tendency which exhibited itself towards the end of the last century, and the romantic reaction and consequent admiration for the middle age which succeeded, though both must be regarded as one-sided influences, had an unquestionable effect in calling attention to what was really great in the artistic productions of these respective periods; and during the present century, the history of art has gradually assumed a more important place as a department of general history. It was only in very recent times, however, that a complete artistic history appeared in Kugler's *Handbook of the History of Art*, which has been partially translated into English, and edited by Sir Charles Eastlake. In the original work, which is very excellent, the immense mass of material which the subject offered has been arranged in periods, and treated in such a manner as to present a sketch which is complete in itself, whilst at the same time its connection with and dependence on general history, social, political, and philosophical, are carefully indicated throughout. Alongside of Kugler's history, that of Schnaase falls to be mentioned—a work giving a philosophical and historical account of the origin of the various styles, and their connection with each other; as also the works of Lübke, Springer, and Carrière. Kinkel's history of Christian art has unhappily remained incomplete. Waagen's works on art and artists in England, France, and the other countries by which Germany is surrounded, are the best artistic handbooks for the traveler. Those which have reference to England have been translated. There are many other historical works of importance on special departments and separate schools of art, monographs and the like, but, with the exception of Stirling's *Annals of the Artists of Spain*, and *Velasquez and his Works*, very few belong to our own literature.

ARTA, the ancient *Ambracia*, a t. of Epirus, and ceded by Turkey to Greece in 1881; 7 m. from the northern coast of the gulf to which it gives name, and 39 m. s. from Janina. It stands on the left bank of the river Arta, the ancient *Aracthus*, whence the modern name. It is the see of a Greek bishop, and is governed by a bey. Pop. about 4000. It has a considerable trade, and manufactures, chiefly of cloths and leather; the *floccata*, or "shaggy capote," alluded to in Byron's earlier poems, is greatly esteemed; but the town has never recovered from the disasters of 1828, when it was stormed by the Greek patriots under Marco Botzaris. Portions of the old walls, which were of great strength, and the foundations of the acropolis, are the only relics of Hellenic times. Remains of the lower empire exist in a convent founded 845 A.D. by the empress Theodosia.

The ancient city of Ambracia, founded by a Corinthian colony about 635 B.C., was at one time a flourishing independent state, with a considerable territory. It was ruined in the struggle with the Amphilocheians, and subsequently became subject to Philip of Macedon. Pyrrhus made it the capital of Epirus, after which it fell into the hands of the Ætolians, and lastly of the Romans. See **AMBRACIA**.

ARTA, GULF OF, an arm of the Ionian sea, 25 m. long and 10 wide, between Turkey and Greece. Until 1881, the whole of the northern coast was Turkish; but in that year the portion east of the river Arta was ceded to Greece. It was arranged that the gulf should be neutral, the fortress commanding the entrance to the gulf on either side being disarmed. Under its ancient name of the Ambraciote gulf (*sinus Ambracius*), it separated Epirus and Acarnania.

ARTABAZUS, the name of several distinguished Persians in the times of the Achæmenidæ. When Xerxes advanced against Greece, A. led the Parthians and Chorasmians. At a later period he warned Mardonius, but in vain, against engaging in battle at Platea; and on the first indications of defeat, he withdrew his own division, amounting to 40,000 men, from the field, and succeeded, though with great difficulty, in forcing his way through the wilds of Thessaly, Macedonia, and Thrace to Byzantium, where he crossed to Asia. Subsequently, he acted as negotiator between the Spartan Pausanias and Xerxes.—Another A. was general under the Persian king, Artaxerxes Mnemon, and revolted against Artaxerxes Ochus in 356 B.C. For this offense he appears to have been forgiven; and subsequently we find him accompanying king Darius after the battle of Arbela. Alexander rewarded his fidelity by appointing him satrap of Bactria.

ARTANTHE. See **MATICO**.

ARTAX'ATA, the ancient capital of Armenia, on the Araxes, where Hannibal took refuge when Antiochus could no longer protect him. The Carthaginian is said to have superintended the building of that city, which was named from the king Artaxais. It was destroyed by the Romans, 58 A.D., rebuilt by Tiridates, and called Neronia, in honor of Nero, who had granted the kingdom to Tiridates. It was taken and partially destroyed by the Persians in 370, and in 450 it was the seat of an ecclesiastical council over which Joseph, the patriarch, presided.

ARTAXERXES, the name of several Persian kings. A. I., surnamed *Longimanus*, the second son of Xerxes, escaped from the conspiracy of Artaban and others, and ascended the throne in 465 B.C. His long reign, extending to 425, was marked by a decline of power.—A. II., surnamed *Mnemon*, succeeded his father, Darius II., in 405 B.C. After gaining the victory over his brother Cyrus, he became involved in war with Sparta, which ended with the Antalcidean treaty of peace. He d. in 361.—A. III., surnamed *Ochus*, was the son and successor of the former, and reigned in the true style of oriental despotism until 338 B.C. One of his most daring exploits took place in Egypt, where he caused the divine bull Apis to be slaughtered and cooked as ordinary beef. A. III. was poisoned in 338 by his eunuch Bagoas. It is said that his flesh was eaten by cats, and that hilts for scimitars were made of his bones.—The founder of the new Persian dynasty of the Sassanidæ (which ruled from A.D. 226 to 651) was named A.

ARTEDI, PETER, a celebrated naturalist, was b. on the 22d of Feb., 1705, at Anund, in the province of Angermannland, Sweden. He was at first designed for the church, and entered the university of Upsala, intending to pursue the usual course of philosophy and theology; but he soon abandoned all thought of the ministry, and betook himself to medicine. In 1728, Linnæus went to Upsala, to study the same science, and a close intimacy sprang up between the young men. They worked together, and, to a certain extent, on the principle of a division of labor. Physiology, chemistry, and mineralogy they pursued in common; but to this A. added ichthyology, and Linnæus ornithology and entomology. In 1734, A. sailed for England, and Linnæus went to Lapland, each having made the other his heir and executor of all his scientific documents. While in London, A. wrote the preface to his *Ichthyologica*. Next year he went to Leyden in Holland, where he found Linnæus just arrived from the north. Each showed the other the results of his labors. A.'s useful career was abruptly ended, on the 21st of Sept., 1735, by his falling into one of the canals near Amsterdam.

A.'s only complete work is the *Philosophia Ichthyologica*. The *Synonymologica* is described as a work of extraordinary labor, but somewhat confused. Linnæus faithfully performed his duty as his friend's executor. He arranged, corrected, and completed his manuscripts, and published the whole, together with a life of the author, in 1738. According to Cuvier, the great work of A. is the first named, which gave a truly scien-

tific character to the study of fishes. The only error of any magnitude which occurs in it is including the cetaceæ among fishes. A. was also a distinguished botanist. He was the first to indicate, as a special characteristic, the presence or absence of involucre in the umbelliferous plants, whose species are so difficult to distinguish from each other. Linnæus has called a genus of these, in memory of his friend, *artedia*.

ARTEMIDORUS of EPHESUS, a geographer who lived about 100 B.C., who voyaged around the Mediterranean, the Red sea, and probably parts of the Indian ocean. He visited Iberia and Gaul, and corrected some of the errors of Eratosthenes. His work (in eleven books) is nearly all lost, but it was highly prized and frequently quoted by Greek and Roman writers. A few fragments have been found, and an abridgment, made by Marcianus, still exists. From what is known, the loss of A.'s work is deeply regretted, as he gave most minute accounts of the manners and customs of the people which he visited.

ARTEMIS. See **DIANA**.

ARTEMISIA, queen of Caria (circa-350 B.C.), was the wife of Mausolus, and celebrated for the magnificent mausoleum which she caused to be erected to her husband's memory. See **MAUSOLEUM**.—Another A., queen of Halicarnassus, accompanied Xerxes in his expedition against Greece, and distinguished herself at the battle of Salamis (480 B.C.); she ended her life, in consequence of an unfortunate attachment, by leaping from a rock.

ARTEMISIA, a genus of plants of the natural order *compositæ*, sub-order *corymbifera*, in which the flowers of the disk are hermaphrodite, those of the ray in one row, the bracts forming a roundish imbricated head, the receptacle naked or hairy, the achænia obovate, and destitute of pappus. The heads of flowers are numerous and small; the leaves generally much divided. There are many species, herbaceous plants and shrubs, natives chiefly of the more temperate regions of the eastern hemisphere. They have generally an aromatic smell, more or less agreeable, and a warm, sometimes rather acrid and bitterish taste.—To this genus belongs **WORMWOOD** (*A. absinthium*), the *apsinthion* of the ancient Greeks, to whom its medicinal properties were well known. It is a native of Britain, the continent of Europe, and the northern parts of Asia, growing in waste places, by waysides, etc. It is a perennial, 2 to 4 ft. high; its leaves bipinnatifid and clothed with a silky down, and its small hemispherical drooping heads of flowers are of a dingy yellow color, and are produced in axillary panicles. It is aromatic and bitter, containing a bitter principle and an essential oil, both of great strength, upon account of which it is used in medicine in various forms (oil, extract, tincture, etc.), as a stomachic and anthelmintic or vermifuge. It was formerly in much use as a febrifuge. It is a plant very frequently to be found in cottagers' gardens, occupying an important place in their domestic pharmacopœia. It is an essential ingredient in a number of compound medicines. Its roots, and those of some other species of this genus, have been recommended in epilepsy.—**SEA WORMWOOD** (*A. maritima*, including a variety which has been called *A. gallica*), a native of salt-marshes in Britain and other parts of Europe, possesses similar properties, and is occasionally used for the same purposes; as also **ROMAN WORMWOOD** (*A. pontica*), a native of the middle and south of Europe, but not of Britain—**TARTARIAN WORMWOOD** (*A. santonica*), a native of Tartary, Persia, and other parts of the east; and **INDIAN WORMWOOD** (*A. indica*), a native of the Himalaya, abounding at elevations of 2000 to 6000 ft. Indian wormwood grows to the height of 12 ft. It is considered in India a powerful deobstruent and antispasmodic. **TREE WORMWOOD** (*A. arborescens*), a native of the s. of Europe and the Levant, is also larger and more shrubby than the common wormwood, which, in characters and qualities, it much resembles.—The dried flower-buds of a number of species of A. are sold under the names of **WORMSEED** and of *semen contra*, *semen cina*, *semencine*, etc., and have long been in much repute as an anthelmintic. *A. santonica*, and *A. sieberi* (or *A. contra*), a native of Palestine, are believed to yield much of the wormseed which is brought from the Levant, also *A. judaica*, a native of the east and of Barbary, which is regarded as the principal source of the Barbary wormseed. The flower-buds of *A. glomerata*, *A. lerchiana*, and *A. pauciflora*, natives of the banks of the Volga, are also said to form part of the wormseed of the shops; and those of *A. vahlbiana* are collected in the n.e. of Persia, and form the *semen cina levanticum* or *semen cina in grains*. The flower-buds of *A. camphorata*, a Mediterranean plant, which is said to have been found on the sea-coast of England, form the anthelmintic called *semen seriphii* or *barbotine*. Those of *A. camphorata*, another native of the south of Europe, are used in the same way. •Even those of *A. absinthium* and *A. vulgaris* are used under the name of wormseed.—The plants from which the bitter aromatic liquor called *extrait, eau or crème d'absinthe* is prepared, are small low-growing species of A. (*A. mutellina*, *A. glacialis*, *A. rupestris*, *A. spicata*, etc.), found on the Alps, and known to the inhabitants of the Alps by the name of *genipi*. This liqueur, generally diluted with water, is sometimes used by persons so devoted to the pleasures of the table that they cannot wait for the natural return of appetite, and also by those who really suffer from weakness of digestion. It is a useful and agreeable stomachic, and is very popular in France—**MUGWORT** (*A. vulgaris*), a common native of Britain and of the continent of Europe, often found about ruins and in waste places, grows to the height of 3 or 4 ft., with pinnatifid leaves and somewhat racemed small flowers, which have each five florets of the ray. It emits, when rubbed, an agree-

able smell, and has a bitter taste. In Germany, the young shoots and leaves are used in cookery for seasoning. It is used also for the same medicinal purposes as wormwood, but is weaker. Its leaves, and those of some of the other species, are used as fomentations for cleansing and healing wounds.—SOUTHERNWOOD (*A. abrotanum*) is a shrubby plant with long straight stems, 3 to 4 ft. high, the lower leaves bipinnate, upper leaves pinnate, their segments hair-like. It is a native of the s. of Europe and middle parts of Asia, and has long been a favorite plant in cottage-gardens in Britain. It has an aromatic and pleasant odor. The leaves are used to drive away moths from linen; and in some parts of the continent of Europe, as an ingredient in the manufacture of beer. The smell of this plant appears to be peculiarly disagreeable to bees, which retreat from it; and a little branch of southernwood is sometimes efficaciously used when they are swarming, to promote their ascent into the new hive placed over them.—TARRAGON (*A. dracunculus*) is a perennial plant, a native of Siberia, and long cultivated in gardens in Britain. It has a branching stem 1 to 1½ ft. high, with narrow leaves. It is fragrant, and has an aromatic smell and taste. The leaves and tender tips are a favorite ingredient in pickles. An infusion of the plant in vinegar is used as a fish-sauce.—The leaves of *A. maderaspatana* are regarded in India as a valuable stomachic, and are also used in anodyne fomentations.—MOXA (q.v.) is prepared by the Chinese from the leaves of *A. moxa* and other species, the whole surface of whose leaves is covered with a thick down.—*A. acetica*, a Persian species, is said to have a strong odor of vinegar.

ARTEMISIUM, the name of the northern coast and of a promontory in Eubœa, opposite the Thessalian Magnesia, and named from the temple of Artemis; belonging to the t. of Histiaæ. Off this coast occurred the conflict of the Grecian fleet with the fleet of Xerxes.—The name also of a mountain between Argolis and Arcadia, now Mt. Turniki, on which was a temple; also of a promontory in Caria, which was crowned with a temple to Artemis.

ARTEREOTOMY, or the opening of an artery, is an operation that has been strongly advocated in those cases in which it is desirable to produce a more decided and immediate effect upon the cerebral circulation (as in severe forms of sanguineous apoplexy) than could be produced by ordinary venesection. It is supposed by some surgeons to relieve pressure on the brain more efficiently than opening the jugular vein could do; and whether this is the case or not, it is a simpler and less dangerous operation. The only vessel operated on is either the temporal artery itself or one of its main branches. The operation is a simple one, but should, of course, only be undertaken by a surgeon. To arrest the flow of blood when sufficient has been taken, the artery should be completely divided, and after the parts have been sponged, a compress, or small pad, should be applied to the wound, and secured by a bandage, which must be carefully adjusted, so as, if possible, to remain undisturbed for four or five days, when it may be removed, and the wound covered with a strip of plaster.

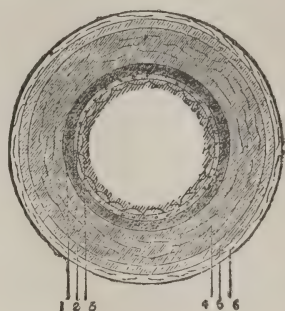
ARTERIES, DISEASES OF. Most of the important morbid conditions of the arteries are those which are occasioned by the deposition of *atheroma* (a Greek word signifying a tumor or deposit containing matter like *athërè*, meal or groats) on the free surface of the inner coat of the vessel; a new inner lining to the artery being thus furnished. As *atheroma* has the effect of weakening, enlarging, and occluding arteries, according to the extent and period of the deposition, it is expedient briefly to notice the most important stages of its progress. In the earliest stage, *atheroma* consists of a thin, soft, and clear membrane, lining a part or the whole of the tube. It seems to be a mere addition to the artery, in whose original coats there is no appearance of disease. It is most probably a deposit on the inner surface from the blood. On the inner surface of the new coat, a similar layer gradually forms, and in course of time, becomes the foundation of subsequent formations; and when many strata have thus been deposited, the collective mass ceases to be transparent, and becomes converted into an opaque material similar to hardened albumen, and finally to ligament. Until this consolidation occurs, the coats of the artery are not much affected; but by their adhesion to the hardened deposit, they lose their strength, elasticity, and natural color, and their functions are destroyed. The indurated deposit may now undergo one or other of these changes: it may either soften in its interior, in which case it degenerates into a pulpy mass of cholesterine, oil-globules, albuminous and chalky molecules; or it may be converted into a layer of hard, chalky, bone-like matter. This latter change (cretification or ossification) takes place only in the external oldest layers of thick deposits; and nothing intervenes between the bony plate and the middle coat of the artery, for the inner or lining coat partakes in the morbid change. It is obvious that either of these changes (softening or hardening) must gradually lead to disease of the arterial coats generally. The process of change is slow, and the change itself can only be detected in the living subject when it is in an advanced stage. In the radial artery and others which lie superficially, the finger can often detect rings or tubes of chalky matter. Most commonly, however, the state of the arteries is detected by some secondary symptom.

Atheromatous deposit is at first attended with a narrowing of the calibre of the vessel, varying with the thickness of the deposit, and most marked at the points of bifurcation. Smaller arteries may be completely obliterated, whilst the larger arteries may be very much contracted. Thus, the common iliac has been found to have its canal dimin-

ished by about one half, and the great ascending branches of the arch of the aorta, the subclavian and carotid arteries, have been found very nearly closed. A later consequence of the same disease is dilatation of the vessel. The power of the outer coats being insufficient to compress the deposit and to close in upon the blood, by which each contraction of the left ventricle of the heart distends them, they remain wide and distended during the relaxation of the ventricle, and the artery thus slowly expands; the enlargement being most marked at parts where there is most obstruction to the blood-current, as, for example, in curved arteries. These dilatations are apt to terminate in regular aneurism. The changes which we have already described have an effect on the retractile power of the arteries. A healthy artery, if cut across, may shorten to the extent of an inch and a half, as has been actually measured by Dr. Moore ("Diseases of the Arteries," in Holmes's *System of Surgery*, vol. iii. p. 329); but the retractile power is destroyed by the deposition of bony rings or plates. But although incapable of shortening, the arteries sometimes become abnormally lengthened, and consequently become not only dilated, but also tortuous. If the outline of superficial arteries thus affected be watched, each pulsation of the heart is seen to increase their curvature; and deep-seated arteries (as the iliac) are thus often forced from their normal positions. Another condition involving much danger is this: an ossified artery loses the smoothness which the interior of the vessel ought to present, and from the displacement or cracking of a bony plate, there may be sharp, rough projections exposed, to which the fibrin of the circulating blood may adhere. These little clots becoming detached, may be carried with the blood till they become arrested, and plug up an artery, thus presenting cases of embolism or thrombosis (q.v.). Again, the relation of this disease to accidents and surgical operations on arteries is obvious. A blow may crush a diseased artery, when a healthy elastic vessel might have escaped injury. Such a slight movement as suddenly lifting the arm to the head, for the purpose of securing the hat in a sharp gale, has been known to have been followed by aneurism of the axillary artery. A ligature applied to any ossified artery, is very apt to cause it to break, and the difficulty of securing such vessels is often very great. It is to this form of disease that most of the failures of operations for aneurism are due. Having thus noticed the most important changes which are induced in the arteries by atheroma, and the evil consequences to which they may give rise, we shall now direct attention to an important cause of occlusion—that, namely, in which the canal is closed by an imported foreign body, and especially by fibrinous plugs originally formed in the heart, and transported to other parts in the stream of the blood. When a large artery, as, for example, the principal artery of one of the limbs, is "suddenly plugged in its higher part, a sensation of severe pain is commonly the immediate result of the accident. In some cases, the pain extends along the course of the vessel, which, though pulseless, is extremely tender; in others, the suffering is referred to some distant part of the limb, as, for instance, to the calf. Signs of a deficient circulation succeed, and they may amount to pallor, loss of temperature, numbness of the surface, or even to that 'torpor' which is observed to precede the total death of a limb in certain cases of injuries of vessels. Such torpor implies not only a loss of circulating blood, but also a cessation of all feeling and motor power in the limb."—Moore, *op. cit.*, p. 335. Although gangrene (q.v.) is always to be feared as the result of an obstructed artery of large size, it does not invariably follow; as a collateral circulation may be established, and the life of the limb may be thus saved. Very young persons will endure the obliteration of very large vessels without gangrene; and a case is on record (*Med. Chir. Trans.*, vol. xxix. p. 214) in which "all the main arteries of both upper extremities and of the left side of the neck were reduced to solid cords," and yet no gangrene ensued. From the description of the symptoms, the nature of a case of sudden occlusion of a large artery by a plug may possibly be recognized, or, at all events, suspected even by a non-professional observer. Medical aid must at once be sought. The early indications of treatment are to preserve the temperature of the part, to favor the establishment of a collateral circulation, to protect the limb from irritation or injury, to give nourishing blood-making food, and to relieve pain by the judicious use of opiates. The later treatment, if the affection is not checked, is that which is described in the article GANGRENE.—*Arteritis*, or *inflammation of the arteries*, was a disease which was formerly recognized by physicians. No such specific general disease is now believed in; but the changes which have been already described as occurring in consolidated atheromatous deposits—either softening or ossification—are accompanied by an unnaturally vascular condition of the attenuated arterial walls, extending to true local inflammation, and even to suppuration.—*Aneurism* (a tumor containing blood, and communicating with the cavity of an artery) has been considered in a special article.

ARTERY (Lat. *aer* and *terō*) named from the old idea that these tubes were air-carriers. Arteries are the vessels through which the blood passes from the left side of the heart to the tissues. The structure of an arterial tube is very complex, and a section of it may be roughly subdivided into three layers, called the coats of the artery: an external, which is elastic and distensible; a middle, which is muscular, contractile, and brittle; an internal, also brittle, smooth, and transparent, being lined with epithelium on the side washed by the blood. The tube is also enveloped in cellular tissue, termed the *sheath* of the A. When an A. is wounded by a sharp instrument, the effect varies

with the direction of the cut. Thus, if longitudinal, the edges may not separate, and the wound may heal without much bleeding; if oblique or transverse, the edges gape, and a nearly circular orifice allows of a profuse hemorrhage. If the A. be completely divided, its walls do not collapse like those of a vein, but pass through certain changes provided by nature to prevent fatal bleeding. The cut orifice contracts, and also retracts into its cellular sheath; this checks the flow of blood, a clot of which shortly forms on the outer side; then another forms inside the vessel; and together, they stem the flow, till the cut edges of the A. have time to throw out lymph (see ADHESION), and heal as wounds of other tissues. When an A. is compressed by a ligature, the brittle inner and middle coats crack, curl inwards, and heal. See BLEEDING.



Subdivisions of arterial wall.

- | | | | |
|-----------------|-------------|--------------|-------------|
| 1. Epithelial, | { internal. | 3. Muscular, | { middle. |
| 2. Fenestrated, | | 4. Elastic, | |
| | | 5. Fibrous, | { external. |
| | | 6. Areolar, | |

The arteries of the human body are all offsets, more or less direct, of the aorta. As each main trunk passes into a portion of the body, it divides into two principal divisions: one, which breaks up into branches for the supply of the tissues in the vicinity—the A. of *supply*; and another, which passes almost branchless to supply the parts beyond—the A. of *transmission*. These, however, anastomose (q.v.) freely, so that the distant tissues are not solely dependent for their supply on only one arterial trunk. Thus, the femoral A. divides in the groin into the profunda, or *deep* femoral, to supply the thigh, and the *superficial* femoral, to supply the leg below the knee. Again, the common carotid divides into *external* carotid, to supply the neck and head, and the *internal* carotid to supply the brain. Although arteries have generally the same distribution or arrangement of branches, they occasionally vary, and thereby are apt to puzzle a superficial anatomist. Mr. Thomas Nunn of London, an excellent human anatomist, has clearly shown that these anomalies in arterial distribution are all governed by the law of arterial distribution just mentioned, a fact which not only simplifies the study of arterial anatomy, but assists the operative surgeon out of perplexing positions. The principal arteries will be considered under their distinctive names. The best authority on arteries is the splendid work of R. Quain. See ARTERIES, DISEASES OF.

ARTESIAN WELLS are perpendicular borings into the ground, through which water rises, from various depths, according to circumstances, above the surface of the soil. The possibility of obtaining water in this way in a particular district depends on its geological structure. All rocks contain more or less water. Arenaceous rocks receive water mechanically, and according to their compactness and purity, part with a larger or smaller proportion of it. A cubic yard of pure sea-sand can contain, in addition to the quantity of dry sand which occupies that space, about one third of its bulk of water. It would part with nearly the whole of this into a well sunk in it, and regularly pumped from. Chalk and other rocks, composed of fine particles, closely compacted together, contain as large a proportion of water; but from the power of capillary attraction, little or none of this water would be drained into a well sunk in such rock. From the existence, however, of numerous crevices in chalk through which the water freely flows, and from the general presence of a larger quantity of water than the porous rock is able to retain, wells sunk in chalk often yield water. There is yet a third class of rocks, which are perfectly impervious to water: such are clays, which are absolutely retentive, neither allowing water to be obtained from them nor to pass through them. When such rocks occur in basins (q.v.) in alternating layers, and in such order that pervious beds are inserted between impervious ones, it is evident that if a perforation is made through the retentive barrier-bed in the lower portion of the basin, the water contained in the water-logged strata will rise through the bore to a height depending upon the pressure of water which has accumulated in the confined sloping space between the two impervious beds. There is a number of porous beds composing the cretaceous measures, resting on the impervious gault, and these, again, are covered by the equally impervious series of the London clay, which form the strata on the surface, and extend to a considerable depth. The edges of the chalk-beds are largely exposed in the higher grounds around London; the water falling on the whole area of these exposed edges, sinks into the more or less porous cretaceous beds, and would, in course of time, by continued accessions, fill up the basin, were it not prevented by the clay above. By driving a bore through this superior bed, the inferior water-logged strata are reached, and the subterranean water rises to the surface, and flows continuously, by means of hydrostatic pressure.

Many such wells exist in London and its vicinity; those which form the ornamental fountains in Trafalgar square descend into the upper chalk to a depth of 393 ft. The most famous artesian well, perhaps, is that of Grenelle, in the outskirts of Paris, where

the water is brought from the gault at a depth of 1798 ft. It yields 516½ gallons of water in a minute, propelled 32 ft. above the surface; temperature, 81°·7 F. An artesian well in course of construction at Pesth, yielded, at a depth of 3100 ft., 175,000 gallons of water per day, of a temperature of 161° F., projected 35 ft. above the surface. One at Sprenburg, Prussia, is 4162 ft. deep.

It is believed that the Chinese have been long acquainted with A. W. They have been in use for centuries in Austria, especially in the neighborhood of Vienna, where they are very abundant. No knowledge existed as to their source, and consequently the boring for them was engaged in and conducted in a rude and empirical manner. An excavation was made till a bed of clay was reached; on this a perforated mill-stone was laid, and through the hole the clay was bored until water rose. As soon as geology took the position of a science, and the theory of A. W. was propounded, the engineer was able, after the geological survey of a district, to discover whether a supply of water could there be obtained in this way. Already, districts formerly dry and arid have received a plentiful supply of water by means of such wells, and many more applications have yet to be made: it seems likely that erelong Africa's deserts may thus be converted into fertile plains. In an official report of the Algerian government for 1856-57, it is stated that artesian borings had been executed in the Sahara of the province of Constantine with remarkable success. The first attempt, after a few weeks' labor, produced a constant stream, forming a perfect river, and yielding 4010 quarts of water per minute, at a temperature of 78° F. There are now upwards of 75 such borings in the Sahara, yielding an aggregate of 600,000 gallons per hour. The result is proving beneficial not only to the country materially, but also to the character and habits of its nomadic Arab inhabitants. Several tribes have already settled down around these wells, and forming thus the centers of settlements, have constructed villages, planted date-palms, and entirely renounced their previous wandering existence.

A. W. have supplied a portion of the data upon which the internal temperature of the earth has been calculated. They have their origin below that zone which is affected by the changing superficial temperature of the seasons, and consequently the water is of a constant temperature. Thus the Grenelle artesian well has a temperature of 81°·7 F., while the mean temperature of the air in the cellar of the Paris observatory is only 53°. MM. Arago and Walferdin observed the temperature as the work proceeded, and found that there was a gradual and regular increase downwards. The latter gentleman made a series of very accurate and careful observations on the temperature of two borings at Creuzot, within a mile of each other, commencing at a height of 1030 ft. above the sea, and going down to a depth, the one of 2678 ft., the other about 1900 ft. The results, after every possible caution had been taken to insure correctness, gave a rise of 1° F. for every 55 ft. down to a depth of 1800 ft., beyond which the rise was more rapid, being 1° for every 44 ft. of descent. There are several very deep borings in the United States; as at St. Louis (3843·5 ft.); Columbus (2775½ ft.); Louisville, Ky. (2086 ft.); Charleston, S. C. (1250 ft.); and Galveston, Tex., where a boring of 3071 ft. failed to reach water.

ARTEVELDE, JACOB, b. about 1285; a brewer of Ghent, a popular leader in the 14th century. In the war between England and France he gave his aid to the former, while the counts of Flanders supported the latter. A., after gaining great advantages over the party of the nobles, went too far when he proposed that the son of Edward III. of England should be elected count of Flanders. For this the Flemings were not prepared, and, in consequence, A. was killed in a popular insurrection Aug. 19, 1345. His son Philip, in 1381, was leader of the people of Ghent in their civil war against Bruges, and gained a victory over count Louis. The latter was afterwards assisted by Charles VI. of France, and Philip A. was slain and defeated in the battle of Rosbeke, 1382. The history of A. has been several times treated dramatically. In England, Sir Henry Taylor, a writer of eminence, has produced a beautiful "closet-play," entitled *Philip Van Artevelde* (1834).

ARTHABASKA, a co. in Canada, province of Quebec; 850 sq. m.; pop. '91, 43,927. Principal town, Arthabaskaville.

ARTHRITIS, inflammation of the joints, arising from wounds, bruises, or surgical operations, and sometimes without apparent cause. All, or a part, of the joint may be involved, and sometimes the pain is intense, even producing delirium or convulsions. The usual treatment is compression by cloths wet with cold water, rest, cooling diet, and sedatives. In some cases cupping or leeching may be proper. See GOUT.

ARTHEPO'DA, the name now used instead of Cuvier's *articulata*. It includes *crustacea*, *arachnida*, *myriapoda*, and *insecta*, but excludes *annelida*. See ARTICULATA.

ARTHUR, king of a tribe of ancient Britons, is supposed to have flourished in the 6th century. He is usually represented as a Christian prince who struggles bravely to maintain the liberty and faith of his country against the pagan Saxons, but there is no evidence for the statement that he fought against the Saxon Cerdic. Neither the Welsh bards nor Nennius assert this; in fact, it would seem to be merely an inference drawn from the supposition that the scene of A.'s exploits was the w. and s.w. of England. But Mr. Skene (*The Four Ancient Books of Wales*, vol. i., pp. 50-60) seeks to prove from

an examination of Nennius (*Historia Britonum*, cap. 50), that the localities of the twelve great battles which A. fought are in Strathclyde, and therefore that he belongs to the region now called Scotland rather than to England. If there is any reality in his history at all, this is probably the correct view of it, but the influence of Geoffrey of Monmouth's fictions, and of the French romances, succeeded in fixing the Cumbrian prince in the more important part of the island. It is a curious fact that no mention whatever is made of A. by the venerable Bede, the oldest of our historians, or by the annalists of the *Saxon Chronicle*; and Mr. Skene's explanation, that these authorities only "record the struggle between the Britons and the Saxons s. of the Humber," is hardly satisfactory.

In the lays of the Welsh bards, supposed to be as early as the 6th and 7th c. (although no manuscript is extant of older date than the 12th c.), A. and his brave companions are celebrated, but modestly and without miracle. It is in Nennius that the legendary additions begin to develop themselves, though Mr. Skene does "not hesitate to receive the Arthur of Nennius as the historic Arthur." Then follow at a distance of three or four centuries the so-called Armorican collections of Walter, archdeacon of Oxford, from whom Geoffrey of Monmouth (q.v.) professes to translate, and in which the marvelous and supernatural elements largely prevail. Here for the first time the magician Merlin comes into association with A. According to Geoffrey, A.'s father, Uther, conceiving a passion for Igera, wife of Gorlois, duke of Cornwall, is changed by Merlin into the likeness of Gorlois, and A. was the result. After his father's death, A. becomes paramount leader of the British, and makes victorious expeditions to Scotland, Ireland, Denmark, Norway, and even to France, where he defeats a great Roman army. During his absence, his nephew, Modred, revolts, and seduces prince A.'s wife, Guannumara. A. returning, falls in a battle with his nephew; and is carried to the isle of Avall-n to be cured of his wounds. Geoffrey's work apparently gave birth to a multitude of fictions which came to be considered as quasi-historical traditions. From these, exaggerated by each succeeding age, and recast by each narrator, sprung the famous metrical romances of the 12th and 13th centuries, first in French and afterwards in English, from which modern notions of A. are derived. In these his habitual residence is at Caerleon, on the Usk, in Wales, where, with his beautiful wife Guinevere, he lives in splendid state, surrounded by hundreds of knights and beautiful ladies, who serve as patterns of valor, breeding, and grace to all the world. Twelve knights, the bravest of the throng, form the center of this retinue, and sit with the king at a round table, the "knights of the round table." From the court of king A., knights go forth to all countries in search of adventures—to protect women, chastise oppressors, liberate the enchanted, enchain giants and malicious dwarfs, is their knightly mission. A Welsh collection of stories called the *Mabinogion*, of the 14th and 15th centuries, and translated into English by lady Charlotte Guest in 1849, gives an idea of the Arthurian legends. Some of the stories "have the character of chivalric romances," and are therefore probably of French origin; while others "bear the impress of a far higher antiquity, both as regards the manners they depict, and the style of language in which they are composed." These latter rarely mention A., but the former belong, as Mr. Skene puts it, to the "full-blown Arthurian romance." Early in the 12th c., the Arthurian metrical romance became known in Germany, and there assumed a more animated and artistic form in the *Parzival* of Wolfram of Eschenbach, *Tristan and Isolot* of Gottfried of Strassburg, *Erec and Iwein* of Hartmann, and *Wigalois* of Wirnt. The most renowned of the heroes of the Arthurian school are Peredur (Parzival or Perceval), Tristan or Tristram, Iwein, Erec, Gawein, Wigalois, Wigamur, Gauriel, and Lancelot. From France, the Arthurian romance spread also to Spain, Provence, Italy, and the Netherlands, and was again retransplanted into England. One of the publications that issued from the press of Caxton (1485), was a collection of stories by Sir Thomas Malory, either compiled by him in English, from various of the later French prose romances, or translated directly from an already existing French compendium. Copland reprinted the work in 1557, and in 1634 the last of the black-letter editions appeared. A reprint of Caxton's *Kynge Arthur*, with an introduction and notes, by Robert Southey, was issued in 1817 (*The Byrth, Lyfe, and Actes of Kyng Arthur*, etc., 2 vols. 4to). The best edition is that by Thomas Wright (Lond. 3 vols., 1866) from the text of 1634. The name of king A. was given during the middle ages to many places and monuments supposed to have been in some way associated with his exploits, such as "Arthur's seat" near Edinburgh, "Arthur's oven" on the Carron near Falkirk, etc. What was called the sepulchre of his queen was shown at Meigle, in Strathmore, in the 16th century. The interest of the legends about king A. and his knights has been revived by the publication of Tennyson's *Idylls of the King* (1859 et seq.). See Turner's *History of the Anglo-Saxons*, Appendix; Ritson's *King Arthur*; De la Villemarqué, *Contes Populaires des Anciens Bretons* (2 vols., Paris, 1842); Grässe, *Die Grosse Sagenkreise des Mittelalters* (Leip. 1842); Skene's *Four Ancient Books of Wales* (Edin. 1868); Glennie's *Arthurian Localities* (1869).

ARTHUR, CHESTER ALAN, b. Vt. 1830, of Scottish parents. His father was a Baptist minister, pastor of churches in Vermont and New York. Chester was the fifth of seven children; he graduated from Union college in 1848, studied law and became legal partner of Erastus D. Culver, of New York. In 1852, A. had the management of the

Lemmon slave case. The case was carried to the court of appeals, and in every removal was decided for the defendants (the slaves). Charles O'Connor was chief of the opposing counsel. In the case of a colored woman put off from a public car in New York, Arthur sued the company and recovered exemplary damages. A whig, and follower of Henry Clay, he early joined the republican party and became a leader. When the civil war broke out, he was intrusted with the arming and subsisting of the troops raised in the state of New York, and was afterwards quartermaster-general, engineer-in-chief, and inspector-general. He was chosen colonel of the ninth regiment for immediate active service, but at the urgent request of Gov. Morgan, declined the place, his military duties in the state being more important. Under his supervision 68 regiments of infantry, 6 battalions, and 10 batteries were sent to the field in four months in 1861. In 1871, he was appointed collector of the port of New York, and four years afterwards was reappointed with universal approval. He resigned after six years of service. In 1880, he was nominated as the republican candidate for vice-president, and was elected. Soon after his inauguration a contest arose in congress between the two wings of the republican party, the "Stalwart" faction of which Arthur was an adherent and Roscoe Conkling a prominent leader, opposing several of the nominations of President Garfield, who was attached to the opposite faction. The struggle culminated in the resignation of Conkling and of his colleague, Thomas C. Platt, from the New York senatorship. Arthur espoused the cause of Conkling, and vainly sought to have him re-elected by the legislature. On July 2, 1881, four months after his inauguration, President Garfield was was shot by the assassin Guiteau, and lingered for 80 days. During this period of suspense Arthur retired into privacy, but at Garfield's death (Sept. 19, 1881) he took the oath of office at his own house in New York, Sept. 20, and was publicly inaugurated president at Washington on the 22d. In a brief address he promised to continue the policy of his predecessor, and, in fact, the change of administration showed its effects in the most gradual manner. The members of Garfield's cabinet had sent in their resignation at once to the new president, but were requested to hold over until the meeting of congress. Only one of them, indeed, Robert E. Lincoln, sec. of war, was permanently retained in office, but some of the others had peremptorily insisted upon resigning. Arthur's administration, while distinguished by no events of great importance, was in most respects satisfactory to the people, and was at least characterized by his earnest endeavor to be the president of the nation at large, and not of a party or of a faction. He d. in New York city, Nov. 18, 1886.

ARTHUR, PRINCE (DUKE OF CONNAUGHT), Prince of the United Kingdom, Duke of Saxony, Prince of Coburg and Gotha, the third son of Queen Victoria, was b. 1850; educated at the Woolwich Military Academy; became a lieutenant in the Royal Engineers, in 1868, and a lieutenant in the Royal Artillery, 1869. In the same year he was made lieutenant in the Rifle Brigade and captain in 1871. Prince Arthur was created Duke of Connaught and Strathearn, and Earl of Sussex, in 1874, and took his seat in the House of Lords in June of that year. In 1879 he married the Princess Margaret Louise, of Prussia, third daughter of Prince Frederick Charles and grand-niece of the Emperor of Germany. In 1880 he was made a general of brigade, and in 1882 major-general and commander of the Guards Brigade in the First Division in the expedition to Egypt. He was appointed commander of the Aldershot district in 1893.

ARTHUR, TIMOTHY SHAY, b. N. Y., 1809; an American story-writer who wrote a great number of moral and domestic tales and sketches which formerly had much popularity and established Arthur's reputation. He d. Philadelphia, 1885.

ARTHUR, WILLIAM, b. Ireland, 1819, an author and clergyman in England and Ireland. He was three years in India as a missionary; afterwards secretary of the Wesleyan church missionary society, and president of the British conference, and was principal of the Wesleyan college in Belfast, 1867-71. He is the author of *Personal Reminiscences of a Mission to the Mysore*, *The Successful Merchant*, *The Tongue of Fire*, and other works.

ARTHUR'S SEAT, a hill in the immediate vicinity of Edinburgh, which rises to the height of 822 ft. above the level of the sea. The ascent is easy, and the prospect from the top unrivaled.

A. S. is supposed to derive its name from the British king of that name. When the hill received this appellation is not known; but as early as the close of the 15th c., Kennedy, the Scotch poet, mentions "Arthur Sate or ony higher hill."

The hill is formed of a mass of trap of various species, upheaved through the carboniferous strata of central Scotland, and presenting on the w. and s. sides, at the height of 570 ft., a perpendicular range of precipices, called Salisbury crags, 60 to 80 ft. high. The trap is in tabular masses, and has elevated and hardened the carboniferous sandstone, shale, and limestone beds, which dip e., and crop out on the w., besides being broken through and overflowed by the trap-rocks. In the center of the hill, the trap often incloses fragments of sandstone, and divides it by veins. The central and upper part of the hill, and the remarkable columns called "Samson's Ribs," consist of basalt. To determine the density of the earth, a series of observations was made in 1855 by lieut.-col. James of the ordnance survey, on the attraction of A. S., or the amount of deviation from the vertical caused by its mass on the plumb-line. Calculation made the mean

density of the whole earth 5.316 (water being 1), or about twice the mean specific gravity of the rocks forming the hill, which experiment gave as 2.710.

ARTICHOKE, *Cynara scolymus*, a thistle-like perennial plant, now growing wild in the s. of Europe, but probably a native of Asia. The genus *cynara* belongs to the natural order *compositæ*, sub-order *cynarocephalæ*, and is distinguished by the bracts of the involucre being fleshy at the base, and emarginate, with a hard point, and the receptacle fringed. *C. scolymus* has the radical leaves 3 to 4 ft. long, somewhat spiny, some of them pinnatifid, some undivided. The stem is 2 or 3 ft. high, branched, with large heads of violet-colored (sometimes white) thistle-like flowers at the summits of the branches. The involucre is tumid, and consists of fleshy, roundish-ovate, crenate, acuminate, imbricated scales. The seeds are elongated and quadrangular, with smooth and firmly attached pappus. The plant has been long cultivated for the sake of the delicate succulent receptacles of the heads of flowers, taken before the flowers expand, which are boiled and eaten, or, on the continent of Europe, eaten raw with salt and pepper. The part used is the same which is called the *cheese* in thistles by children, and is sometimes eaten by them. The tender central leaf-stalk is also occasionally used in the same way as that of the cardoon. Several varieties are in cultivation, differing in the more or less spiny leaves, and the more or less globose form of the head. Artichokes are generally propagated by rooted slips or suckers in spring. These are planted in rows about 4 ft. asunder, and 2 ft. apart in the row. The A. bed continues productive for several years. Seaweed is an excellent manure.—The cardoon (q.v.) belongs to the same genus.—The Jerusalem A. (q.v.) is a totally different plant.

ARTICLE (Lat. *articulus*, a joint) signifies in general a part of a systematic whole. Thus, we speak of the several articles of a confession; the articles of war; a leading article, etc.

The use of A. as a grammatical term arose as follows. In such a sentence as, "He found *that* (or *the*) man *that* he was looking for," the Greeks considered the defining particles as connecting the two parts of the sentence, and called them joints (Gr. *arthra*, Lat. *articuli*); the name was subsequently confined to the first of the two, the other being called the relative.

In English, there are two articles—the definite *the*, and the indefinite *a* or *an*; and other modern languages have corresponding words. But articles are not essential to language. The Latin had no articles, and the Greek, as well as the older Germanic languages, the Mæso-Gothic and Old Norse, e.g., had only the definite A. "In no language," says Dr. Latham, "in its oldest stage, is there ever a word giving, in its primary sense, the idea of *an* or of *the*. As tongues become modern, some word with a *similar* sense is used to express the relation. In the course of time, a change of form takes place, corresponding to the change of meaning."

The definite articles originate uniformly in demonstrative pronouns. Eng. *the* is only a weakened form of *that* (Anglo-Sax. *that*). The same is the case with Ger. *der*; and Fr. *le*, Ital. *il* and *lo*, and Sp. *el*, are all from the Lat. *ille*, "that." In like manner, *an* or *a* is from the old form of *one* (ane); Ger. *ein* is both *one* and *a*; and so are Fr. *un*, Ital. and Sp. *uno*, both from Lat. *unus* = *one*.

In the Scandinavian tongues, the article is attached to the end of the word; the Danish, for example, writes *kong-en*, the king; *hus-et*, the house.

ARTICLES OF ASSOCIATION, the printed regulations for the conduct of the business of a joint-stock company registered under the Companies Act passed by the British parliament in 1862. They are signed by the subscribers to the memorandum of association, and with the latter instrument are registered by the registrar of joint-stock companies, who grants a certificate of incorporation. The model regulations prescribed by the Companies Act form the Articles of Association, unless expressly altered by the company. See JOINT-STOCK COMPANY.

ARTICLES FOR THE GOVERNMENT OF THE UNITED STATES NAVY. Although the regulations governing the navy are in many respects similar to those of the army (see ARTICLES OF WAR), there is a considerable difference between the two, the special features, as far as the navy is concerned, being such as would most naturally apply to affairs afloat in contradistinction to those on shore. There are in all sixty articles, the first of which direct all commanders of fleets, squadrons, naval stations and vessels belonging to the navy to show in themselves a good example of virtue, honor, patriotism and subordination. The second article directs a due observance of the Sabbath and the holding of divine service wherever chaplains are attached, and the third relates to punishment to follow irreverent or unbecoming behavior during divine service. Following these are six articles in relation to courts-martial and punishments and later there are forty or more other articles on the same subject. The punishment of imprisonment for life or for a stated term at hard labor can be substituted by a court-martial in any case where it is authorized to adjudge the punishment of death, and such sentences of imprisonment and hard labor may be carried into execution in any prison or penitentiary under the control of the United States or which the United States may be allowed to use. Any officer who absents himself from his command without leave may, by the sentence of a court-martial, be reduced to the rating of an ordinary seaman. Any com-

missioned officer who, having tendered his resignation, quits his post or proper duties without leave, and with intent to remain permanently away, prior to due notice of the acceptance of his resignation, is deemed and punished as a deserter. No person connected with the navy is under any pretense to import in a public vessel any article which is liable to the payment of duty. Distilled spirits are admitted on board vessels of war only upon the order and under the control of the medical officers of such vessels, and to be used only for medical purposes. No person in the navy is allowed to take out of a prize any money, plate, goods, or any part of her equipment, unless it be for its better preservation or unless such articles are absolutely needed for the use of other vessels or United States forces before judgment has been passed by a competent court. Dismissal follows if any one in the naval service uses force to return any fugitive from service or labor, as does also the enlisting of any person who is known to be a deserter, an insane or intoxicated person or minor, without the consent of the latter's guardian. When the crew of any vessel are separated from their vessel by means of her loss or destruction, all the command and authority given to the officers of such vessel remain in full force until the ship's company are regularly discharged from or ordered again into service. Courts of inquiry are as a rule held to inquire into the loss of vessels. All offenses committed by persons belonging to the navy while on shore are punished as though they had been committed at sea. No officer is dismissed from the navy except by order of the President or by sentence of a general court-martial; and in time of peace no officer can be dismissed except in pursuance of the sentence of a general court-martial or in mitigation thereof. Any person refusing to give evidence before a court-martial can be imprisoned by the court for any time not exceeding two months. No sentence extending to loss of life or the dismissal of a commissioned or warrant officer can be carried into execution until confirmed by the President. All other sentences require only the confirmation of the commander of the fleet or officer ordering the court. Every officer who is authorized to convene a general court-martial has power on revising the proceedings to remit or mitigate, but not to commute, the sentence of any such court which he is authorized to approve and confirm.

ARTICLES OF FAITH, are summarized statements of the views held and taught by a religious body as the essential doctrine of its system. They, therefore, in a way, are the same in effect as a creed (q.v.). They have been divided by Protestant writers into articles that are fundamental and those that are non-fundamental, and are of progressive growth, historically considered. The best-known articles of faith are the Apostles' Creed (composed about 300 A.D.), the Nicene Creed, established by the Council of Nice (A.D. 325); the Athanasian Creed; the statements of faith, promulgated by the Council of Constantinople (A.D. 381), and by the Council of Ephesus (A.D. 431); the Thirty-Nine Articles (q.v.) of the Church of England, drawn up by Cranmer and Ridley in 1562; the Augsburg Confession, the Helvetic Confession, the Thirty-Seven Articles of the Church of the Netherlands, and the articles of the Methodist Episcopal Church. No definite articles of faith appear to have been drawn up by the primitive church until the spread of Christianity and the geographical separation of its different branches made some brief formularies necessary as a basis of union.

ARTICLES OF WAR. The Articles of War are intended to set forth as clearly and concisely as possible the various offenses and punishments for the same in order that officers and men may understand exactly what they are to expect when they commit breaches of discipline. They also show the general methods of procedure to be followed in cases of courts-martial or courts of inquiry. And in order that all shall be thoroughly familiar with what is contained in the various articles they are to be read and published, once in every six months, to every garrison, regiment, troop or company in the service of the United States, and are to be duly observed and obeyed by all officers and soldiers in said service. These rules were originally borrowed from the English mutiny act, annually passed by parliament, and their articles of war established by the King.

The existing articles in the United States service were enacted April 10th, 1806, and are substantially the same as those borrowed July 30th, 1775, and enlarged by the old Congress from the same sources September 20th, 1776. There are now one hundred and twenty-eight articles, nineteen of which relate to the organization and the methods of proceedings in general and regimental courts-martial and courts of inquiry, two to the oaths to be administered upon such occasions, five to the subject of arrests, twenty-two to special features of the regulations, and the remainder, forming the very large majority, to the punishments that can be awarded for certain specified offenses. Officers are tried only by general courts-martial, and no officer shall, when it can be avoided, be tried by officers inferior to him in rank. In war times a field officer may be detailed in every regiment to try soldiers for offenses that are not capital. Regimental courts are ordered on enlisted men by officers commanding corps, regiments, garrisons, forts, or other places; and they consist of three officers who have power to try all offenses not capital. The jurisdiction of the courts is limited and they cannot inflict a fine exceeding one month's pay, nor can they imprison an offender or put him to hard labor for a longer time than one month. When an officer is put under arrest for the purpose of trial, except at remote military posts or stations, the officer by whose order he is arrested must see that a copy of the charges on which he is to be tried is served upon him within eight days after his arrest; and that he is brought to trial within ten days thereafter,

unless the necessities of the service prevent such trial; and then he shall be brought to trial within thirty days after the expiration of the ten days. If a copy of the charges be not served, or the arrested officer be not brought to trial as above stated, the arrest ceases. Any general officer commanding a United States army or a separate department is competent to order a general court-martial either in time of peace or in time of war, and in war times a division commander or separate brigade commander has similar authority. But when any such commander is the accuser or prosecutor of any officer under his command, the court is appointed by the President, and its proceedings and sentence are sent directly to the secretary of war, by whom they are placed before the President, for his approval or orders in the case. Some of the offenses of which courts-martial can take cognizance are, mustering persons not soldiers, making unlawful enlistments, wasting ammunition, losing or spoiling accoutrements, disrespect toward the President or commanding officer, reproachful or provoking words, gestures, or menaces, challenging or accepting a challenge to fight a duel, or acting as second in a duel, absence without leave or after leave shall have expired, misconduct at divine service, fraud, embezzlement, releasing a prisoner without authority. Drunkenness on duty in the case of an officer was punishable by dismissal from the service. In the case of an enlisted man the award was at one time such corporal punishment as a court-martial might direct, but in 1875 this article was amended and since then no court-martial has been permitted to award flogging or branding, marking or tattooing on the body. Cashiering from the service is awarded by court-martial in the case of officers who knowingly entertain or receive deserters or who do not upon the discovery of a deserter arrest and give notice at once to the corps in which such deserter last served. Making false returns also subjects the offender to punishment by cashiering. While giving courts-martial great latitude, the articles of war prescribe certain punishments that, after full investigation, are to be awarded in case the offense be proven. For example, dismissal from the service follows the signing of a false certificate, taking gratification money on mustering a regiment, troop, battery, or company; or making a false muster, placing a duty or imposition upon the sale of liquor, victuals or the necessities of life brought into the garrison for the use of the soldiers, dueling or challenging another to fight a duel, drunk on duty, refusing, in the case of personal differences, to see justice done the offender and reparation made to the party injured, refusing or willfully neglecting, except in war times, to deliver offenders to the civil magistrates, when such offenses have been committed over which they have jurisdiction, conduct unbecoming an officer and a gentleman, leaving limits of confinement before being released by the commanding officer. In time of peace no sentence directing the dismissal of an officer is carried into execution until approved by the President. Dismissal when awarded by division or brigade courts must always be confirmed by the general commanding the army in the field to which the division or brigade belongs, before it can be carried into execution. The articles of war make a marked distinction between offenses committed in time of war and similar misdemeanors in peace times. For example, no sentence inflicting the punishment of death shall be carried into execution until it shall have been confirmed by the President; except in the cases of persons convicted in time of war as spies, mutineers, deserters, or murderers; and in the cases of guerrilla marauders, convicted in time of war of robbery, burglary, arson, rape, assault with intent to commit rape, or of violation of the laws and customs of war. In such accepted cases the sentence of death may be carried into execution upon confirmation by the commanding general in the field or the commander of the department, as the case may be, thereby granting an authority to such officers as they cannot wield in time of peace. The punishment of death can be awarded at the option of a court-martial to any officer or soldier who, on any pretense whatsoever, strikes his superior officer, or draws or lifts up any weapon, or offers any violence against him, being in the execution of his office, or disobeys any lawful command of his superior officer.

Exciting or joining in any mutiny or sedition, or failing to resist the same, subject the offender to suffer death, as do sleeping on post, raising false alarms, cowardice and misbehavior before the enemy, surrendering a garrison or fortress unnecessarily, disclosing the watchword, relieving the enemy or corresponding with him, doing any violence to any persons bringing provisions or other necessities to camp, and desertion.

The articles of war in relation to the crime of desertion are the only ones that have very recently been amended and at present they stand as follows. No person shall be tried or punished by a court-martial for desertion in time of peace and not in the face of an enemy, committed more than two years before the arraignment of such person for such offense, unless he shall meanwhile have absented himself from the United States, in which case the time of his absence shall be excluded in computing the period of the limitation: provided that said limitation shall not begin until the end of the term for which said person was mustered into the service. See COURT-MARTIAL; DESERTION; MARTIAL LAW.

In England there are separate articles of war for the forces serving in England and India, for the marines, and for the navy. They were all, as at present constituted, made law by acts of Parliament in 1858-9.

ARTICLES, THE SIX, often mentioned in the ecclesiastical history of England in the 16th c., were articles imposed by act of parliament in 1539, when Henry VIII. being displeased with some of the bishops most favorable to the reformation, their opponents for a time regained the ascendancy. These A. asserted the doctrine of transubstantiation, declared communion in both kinds not to be necessary, condemned the marriage of priests, enjoined the continued observance of vows of chastity, and sanctioned private masses and auricular confession. The act imposing them was popularly called "the six-stringed whip." Severe penalties were appointed for writing or speaking against them, and for abstaining from confession or the sacrament at the accustomed times, for priests failing to put away their wives, and for persons writing or speaking against the doctrine of transubstantiation. Archbishop Cranmer vainly opposed the act in the house of lords: the king was resolute to have it passed. Its severity was mitigated by a subsequent act of his reign (1544), and although it continued substantially unrepealed, it was transgressed with impunity even by ecclesiastical dignitaries.

ARTICLES, THE THIRTY-NINE, of the church of England, are the articles of religion which were agreed upon by the archbishops and bishops of both provinces and the whole clergy in the convocation held at London in the 4th year of Elizabeth, 1562, under Archbishop Parker. To have a clear view of the history of these important articles, we must go back to the promulgation of the original ones, 42 in number, in the reign of Edward VI. The council appointed by the will of Henry VIII. to conduct the government during the king's minority, was for the most part favorably disposed towards the reformed opinions, and the management of church affairs devolved almost entirely upon archbishop Cranmer. In the year 1549, an act of parliament was passed, empowering the king to appoint a commission of 32 persons, to make ecclesiastical laws. Under this act, a commission of 8 bishops, 8 divines, 8 civilians, and 8 lawyers (amongst whom were Cranmer, Ridley, Hooper, Coverdale, Scory, Peter Martyr, Justice Hales, etc.) was appointed in 1551, and one of its first acts was to draw up a code of articles of faith. These were 42 in number, and were set forth by the king's authority in 1553. Strype and Burnet make it appear that these 42 articles were agreed upon in the convocation that was sitting in 1552, but this was not the case. Fuller, speaking in his quaint way of this convocation, declares that it had "no commission from the king to meddle with church business, and," he adds, "every convocation in itself is born deaf and dumb, so that it can neither hear nor speak concerning complaints in religion till first *Ephphatha*, 'Be thou opened,' be pronounced unto it by royal authority. However," he continues, "this barren convocation is entitled the parent of those 42 articles which are printed with this title, *Articuli de quibus in Synodo Londinensi 1552 A.D. inter Episcopos et alios convenerat.*" To these articles was prefixed the catechism, and there is no doubt of Cranmer having had the principal hand in their composition; for he owned before Queen Mary's commission that they were his doing. But immediately after their publication, Edward died, and one of the first acts of the convocation summoned with the parliament in the first year of Queen Mary, was to declare that these 42 articles had not been set forth by the agreement of that house, and that they did not agree thereto. In 1558, Elizabeth succeeded her sister. In 1559, Parker was installed in the see of Canterbury, and immediately the other vacant sees were filled up. And now came a fresh opportunity of drawing up some articles of faith which might serve as a test of orthodoxy in the reformed church. Parker applied himself to this work, and, for the purpose, revised the 42 articles of king Edward, rejecting 4 of them entirely, and introducing 4 new ones, viz., the 5th, 12th, 29th, and 30th as they now stand; and altering more or less 17 others. This draft Parker laid before the convocation which met in 1562, where further alterations were made; and the 39th, 40th, and 42d of king Edward's, which treated of the resurrection, the intermediate state, and the doctrine of the final salvation of all men, were finally rejected. The 41st of King Edward's, which condemned the Millenarians, was one of the four which Parker omitted. Thus the articles were reduced to 39. They were drawn up and ratified in Latin, but when they were printed, as was done both in Latin and English, the 29th was omitted, and so the number was further reduced to 38. From these 38 there was a further omission, viz., of the first half of the 20th article, which declares that "the church hath power to decree rites and ceremonies, and hath authority in controversies of faith." As all the records of convocation perished in the great fire of 1666, it is very difficult to ascertain how these omissions arose. However, in 1571, the articles once more underwent revision. Archbishop Parker and Bishop Jewell made a few trifling alterations, and the 29th being restored, the convocation which was then sitting ratified them both in Latin and English, and an act of parliament was passed in that year compelling the clergy to subscribe "such of them as only concern the confession of the true Christian faith, and the doctrine of the sacraments." There still, however, remained some difficulty as to which was the authorized copy, some of the copies being printed with, and others without, the disputed clause of the 20th; but this was finally settled by the canons passed in the convocation of 1604, which left the 39 articles as they now stand. "His majesty's declaration," which precedes them, and directs that they shall be interpreted "in their literal and grammatical sense," was prefixed by Charles I. in 1628.

It may be interesting to know from what other sources the 39 articles are derived.

Some of them, as the 1st, 2d, 25th, and 31st, agree not only in their doctrine, but in most of their wording, with the confession of Augsburg. The 9th and 16th are clearly due to the same source. Some of them, as the 19th, 20th, 25th, and 34th, resemble, both in doctrine and verbally, certain articles drawn up by a commission appointed by Henry VIII., and annotated by the king's own hand. The 11th article, on justification, is ascribed to Cranmer, but the latter part of it only existed in the articles of 1552. The 17th, on predestination, may be traced to the writings of Luther and Melancthon.

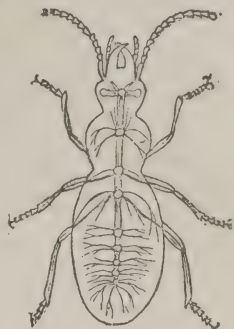
The 39 articles have been described as "containing a whole body of divinity." This can hardly be maintained. They contain, however, what the Church of England holds to be a fair scriptural account of the leading doctrines of Christianity, together with a condemnation of what she considers to be the principal errors of the church of Rome, and of certain Protestant sects. As far as they go (and there are many things unnoticed by them) they are a legal definition of the doctrines of the church of England and Ireland; though it is to the *Book of Common Prayer* that members of that communion look for the genuine expression of their faith. They were adopted by the convocation of the Irish church in 1635, and by the Scotch Episcopal church at the close of the 18th century. Corpus Christi college, Cambridge, contains the only copies of the A. in manuscript or print that are of any authority. Amongst them are the Latin manuscript of the A. of 1562, and the English manuscript of the A. of 1571, each with the signatures of the archbishops and bishops who subscribed them. See *An Account of the Thirty-nine A.*, By Dr. Lamb,

For other "Articles," see LAMBETH, PERTH, and SCHMALKALD.

ARTICULATA, or ARTICULATED ANIMALS, one of the great primary divisions of the animal kingdom, according to the system of Cuvier, who in this is followed by recent naturalists generally. The term indicates not the possession of articulated members, but the articulated structure of the whole body. The A. are composed of segments articulated or jointed together in a line, each segment being formed of one or more rings, which in some appear externally as mere transverse folds in a soft skin, but are often covered with a hard substance similar in chemical composition to the bones of vertebrated animals. To this the muscles are attached, and it has sometimes received the name of an external skeleton—a name perhaps suggestive of closer and more numerous analogies to the bony framework of the vertebrated animals than actually exist. In some of the A. the rings are almost equally developed; in others, the difference is very great. They are divided into those which have and those which have not articulated members, the first subdivision including insects, arachnida, crustacea, and myriapoda; the latter, annelida and entozoa. Some naturalists rank cirrhopoda (barnacles, acorn-shells, etc.) among the A., and regard them as intermediate between these two subdivisions; others follow Cuvier in placing them among the mollusca. The rotifera (or wheel animalcules) are also placed by some in the second subdivision of the A., but their right to be so placed is by no means well established. It is in the first subdivision only that the rings are very distinctly grouped in what are called segments of the animal; and even in the myriapoda (centipedes, *juli*, etc.) they often seem little else than mere repetitions of each other; whilst in some of the crustacea, as the crabs, the trunk becoming encased in a hard envelope, the segments become immovably united, so that they no longer appear as distinct. A few only of the lowest A., however, are destitute of a distinct head, in which are placed the eyes and other organs of special senses, with regard to which there is considerable difference in the different classes. In it also they usually have jaws for seizing their food and cutting or tearing it to pieces. Their jaws do not open vertically, as in vertebrate animals, but laterally; and there are frequently several pairs of them. Some, however, have the mouth adapted merely for suction. The alimentary tube often proceeds in a straight line from one extremity of the body to the other; and when it is convoluted, its convolutions are usually few. There is no proper heart; but instead of it, we find a *dorsal vessel*, a tube carried along the central line of the body near the back or upper side, and divided in a manner corresponding with the division of the body into rings and segments; a general connection being thus maintained, whilst each segment or each ring has to a certain extent a system of circulation for itself. Respiration is effected either by gills (*branchiæ*), which is the case in those A. that live in water, or by air-tubes (*tracheæ*) and sacs; and the aëration of the blood taking place not merely in one or two, but in many of the rings, great muscular power and activity are maintained without a very active circulation. The muscular power is, indeed, greater in proportion to the size in the A. than in any other animals. The blood is usually white; in some of the annelida alone it is red; but this color (see ANNELIDA) does not indicate any approach to the higher classes of animals, although even Cuvier appears to have regarded it as a reason for assigning to the annelida the first place among the A. The nervous system exhibits a great similarity throughout the whole of the A., and corresponds in its general plan with their system of circulation. It consists of a series of small nervous masses or *ganglia*, arranged in a chain along the central line of the body on the under side of the animal. A ganglion in the head is often termed the brain, and from it proceed the optic nerves and other nerves of the special senses; but it by no means perfectly corresponds to the brain in vertebrate

animals. There is usually a ganglion for each ring. The ganglia themselves are double or composed of two halves, more or less distinctly separated; the connecting cord also is double. In those A. which have articulated limbs, the ganglia are largest in the parts of the trunk with which the limbs are connected, whilst they almost disappear from the more unimportant rings; in the crabs, and some other tailless or very short tailed crustacea, they are condensed into two masses.

The remains of the A. in the fossiliferous rocks are numerous, although often so fragmentary and imperfect that the determination of genus and species is impossible, and their complex organization cannot be thoroughly investigated. It is evident, however, that many of them differed much from any animals now known to exist, and changes can be observed from one geologic period to another; the great crustacean family of the trilobites (q.v.), for example, being found only in the paleozoic rocks. Markings, supposed to be the tracks and burrows of marine worms, appear among the earliest traces of animal life.



Nervous System of an
Insect.

ARTIFICIAL FLOWERS. See FLOWERS, ARTIFICIAL.

ARTIFICIAL HORIZON. a reflecting surface usually of quicksilver in an open dish, useful in finding altitude when the natural horizon is indefinable, and in determining the zero for all instruments by which altitude is measured.

ARTIFICIAL LIMBS. With the exception of the celebrated artificial hand of the German knight, Götz von Berlichingen*—who flourished in the early part of the 16th c. (1513), and who was named *The Iron-handed*—which weighed three pounds, was so constructed as to grasp a sword or lance, and was invented by a mechanic of Nuremberg, our knowledge of artificial limbs dates from the time of Ambrose Paré, whose *Œuvres de Chirurgie* were published in 1575. The twelfth chapter of that volume, as translated by Thomas Johnson in 1605, shows "by what means arms, legs, and hands may be made by art, and placed instead of the natural arms, legs, and hands that are cut off or lost." No improvements worthy of record were made from the time of Ambrose Paré to the beginning of the present century, when Baillif of Berlin constructed a hand which did not exceed a pound in weight, and in which the fingers, without the aid of the natural hand, not only exercised the movements of flexion and extension, but could be closed upon and retain light objects, such as a hat, and even a pen. "Artificial hands," says Mr. Heather Bigg, "are now constructed, by means of which a pin may be picked up from the ground, a glass raised to the lips, food carried to the mouth, and a sword drawn from its scabbard and held with considerable firmness; while a combined arm and hand is fabricated, which is equal to the ordinary requirements of histrionic declamation."—*Orthopraxy*, 1865, p. 157. The utility of an artificial arm depends much on the nature of the stump. A stump above the elbow is best suited for an arm when it gradually tapers to its lowest end, and terminates in a rounded surface. When an arm is removed at the shoulder-joint, and there is no stump, an artificial arm can still be fixed in its proper place by means of a corset. In amputation below the elbow-joint, the best stump is one which includes about two thirds of the forearm; while a stump formed by amputation at the wrist is very unsatisfactory. The simplest form of artificial arm intended to be attached to a stump terminating above the elbow, "consists of a leathern sheath accurately fitted to the upper part of the stump. The lower end of the sheath is furnished with a wooden block and metal screw-plate, to which can be attached a fork for holding meat, a knife for cutting food, or a hook for carrying a weight."—*Op. cit.* p. 160. The arm should be so carried as to represent the position of the natural arm when at rest. It is retained in its position by shoulder and breast straps, and forms a light, useful, and inexpensive substitute for the lost member. More complicated and therefore more expensive pieces of apparatus are made, in which motion is given to the fingers, a lateral action of the thumb is obtained, and the wrist-movements are partially imitated; and a degree of natural softness is given to the hand by a covering of gutta-percha and India-rubber. Such a hand, says Mr. Bigg, is often more symmetrical in aspect than the natural hand, but it possesses no efficient grasping power. Hence provision has to be made for attaching various instruments to its palm, such as special hooks, which can be removed at pleasure, for driving, shooting, etc.; apparatus for using the knife and the fork, for grasping the pen, etc.: indeed, the number and variety of instruments capable of being applied to an artificial hand are extremely great. Nothing has tended so much to the very highest development of artificial arms and hands, as an acci-

*The iron hand of this knight, who has been immortalized by Goethe, is preserved at Jaxthausen, near Heilbronn, and a duplicate of it is in the Schloss at Erbach, in the Odenwald. It is stated in Scott's *Border Antiquities*, vol. ii., p. 206, that the family of Clephane of Carslogie "have been in possession from time immemorial of a hand made in the exact representation of that of a man, curiously formed of steel," which was conferred by one of the kings of Scotland on a laird of Carslogie, who had lost his hand in the service of his country.—See *Notes and Queries* for July 17, 1867, p. 35.

dent which happened more than a quarter of a century ago to the celebrated French tenor, M. Roger, who lost his right arm above the elbow. It was necessary for his future appearance on the stage, that he should have an artificial limb, which would serve the purposes of histrionic action, and permit him to grasp a sword and draw it from its scabbard. Such a contrivance was invented in 1845 by Van Petersen, a Prussian mechanician, and the French academy of sciences commissioned MM. Gambey, Rayer, Velpeau, and Magendie to report upon it. For a history of the nature of the limb, the reader is referred to the report which appeared in the *Comptes Rendus* for that date, or to Mr. Bigg's *Orthopraxy*, pp. 176-181. The apparatus, which weighs less than 18 oz., was tested upon a soldier who had lost both arms. By its aid he was enabled to pick up a pen, take hold of a leaf of paper, etc.; and the old man's joy during the experiment was so great, that the academy presented him with a pair of these arms. Van Petersen's conceptions have been extended and improved by Messrs. Charrière, the celebrated surgical mechanics of Paris, aided by M. Huguier, the well-known surgeon. A very marvelous arm has also been almost simultaneously constructed by M. Bechard, which, "by means of a single point of traction, placed in pronation, executes first the movement of supination, next in succession the extension of the fingers and abduction of the thumb: the hand is then wide open."—Bigg, *op. cit.* p. 190.

Artificial legs, having fewer requirements to perform than artificial arms, are comparatively simple in structure. We borrow the description of the ordinary bucket leg in common use amongst the poorer classes from Mr. Bigg's *Orthopraxy*. "It consists of a hollow sheath or bucket, accurately conformed to the shape of the stump, and having—in lieu of the more symmetric proportions of the artificial leg—a 'pin,' placed at its lower end to insure connection between it and the ground. This form of leg is strongly to be recommended when expense is an object, as it really fulfills all the conditions excepting external similitude embraced by a better piece of mechanism. It is likewise occasionally employed with benefit by those patients who, from lack of confidence, prefer learning the use of an artificial leg by first practicing with the commonest substitute." As, when the body rests on a single leg, the center of gravity passes through the tuberosity of the ischium, it is essential that the bucket should be so made as to have its sole point of bearing against this part of the pelvis.

Of the more complicated forms of artificial leg, three are especially popular. The first of these is of English origin, and, owing to its having been adopted by the late marquis of Anglesea, is known as the *Anglesea leg*. For a description of it the reader is referred to Gray's work on *Artificial Limbs*, one of the firm of Grays having been the constructor of the legs used by the marquis. This was for a long time the fashionable artificial leg. The second leg worthy of notice is that invented by an American named Palmer, and called the *Palmer leg*. From its lightness and the greater ease of walking with it, it has long superseded the Anglesea leg in America. In the third of these legs, also invented in America, and known as *Dr. Bly's leg*, the principal faults of the two other legs have been completely overcome. The advantages of this leg are thus summed up by Mr. Bigg, who has fully described and figured its mechanism: (1.) Adaptation to all amputations either above or below the knee. (2.) Rotation and lateral action of the ankle-joint. (3.) Power on the part of the patient to walk with ease on any surface, however irregular, as, owing to the motion of the ankle-joint, the sole of the foot readily accommodates itself to the unevenness of the ground, which is an advantage never before possessed by any artificial limb. (4.) The ankle-joint is rendered perfectly indestructible by ordinary wear, owing to its center being composed of a glass ball resting in a cup of vulcanite; thus it never gets out of repair, as the Anglesea leg but too frequently does, and the original cost is almost the only one the patient incurs. (5.) The action of the ankle-joint is created by five tendons, arranged in accordance with the position assigned to them in a natural leg. These tendons are capable of being rendered tight or loose in a few instants, so that the wearer of the leg has the power of adjusting with precision the exact degree of tension from which he finds the greatest comfort in walking, and also of giving the foot any position most pleasing to the eye. (6.) There is a self-acting spring in the knee-joint, urging the leg forward in walking, and imparting automatic motion, thus avoiding the least trouble to the patient, who finds the leg literally and not metaphorically walk by itself. (7.) The whole is covered by a beautiful flesh-colored enamel, thus avoiding the clumsy appearance of the wood, as is always found in an Anglesea leg, admitting of its being washed with soap and water like the human skin. (8.) At the knee-joint there is a mechanical arrangement representing the crucial ligaments, and affording natural action to that articulation by which all shock to the stump in walking is avoided. This leg is patented, and, as might be expected, is somewhat expensive.

In cases of arrested development of the lower limbs, short-legged persons may be made of the ordinary height by the use of two artificial feet placed twelve or more inches below the true feet, and attached to the legs by means of metallic rods, jointed at the knee and ankle.

Other parts not entitled to be called limbs, can also be replaced by mechanical art—such as the nose, lips, ears, palate, cheek, and eye. In the present advanced state of plastic surgery, deficiencies of the nose, lips, and palate can usually be remedied by an

operation; cases, however, may occur where an artificial organ is required. Artificial ears are molded of silver, painted the natural color, and fixed in their place by a spring over the vertex of the head. Loss of an eye causes sad disfigurement; but the artificial eyes of Boissonneau (see his *Renseignements Généraux sur les Yeux Artificiels, leur Adoption et leur Usage*), which have been shown in all the recent public exhibitions, completely throw all others in the shade, and cannot be detected without the closest inspection. For further details on all these subjects we must refer to Mr. Bigg's volume, which is a complete encyclopedia on these and allied topics.

ARTIGAS, José, 1755-1851; a Montevidean officer and dictator. At an early age he went into service in Buenos Ayres in the insurrection against Spain, and won a number of victories. He then joined the republican army besieging the Brazilian troops occupying Montevideo, but he acted so independently that the director outlawed him. A. then organized a force of *guachos* (cattle-drivers), defeated the troops sent against him, and forced the junta to give him the whole of Uruguay, and recognize him as an independent chief. He drove the Portuguese out of Montevideo, became dictator, and in 1815 made an unsuccessful effort to take Buenos Ayres. He was defeated from time to time, and in 1820 fled to Paraguay; but the dictator there sent him to Candelaria, where he passed the remainder of his life in peace as a political exile.

ARTILLERY. The history of artillery may be said to date from the discovery of gunpowder, which is popularly attributed to Roger Bacon and Barthold Schwarz, two monks of the thirteenth century, although a mixture of nitre, charcoal, and sulphur was used for explosive purposes by the Chinese during the ninth century. Its introduction into European warfare is due to the Moors, for mention is made of artillery at Cordova in 1280. Ferdinand IV. of Castile took Gibraltar with artillery in 1309, and cannon were used at the sieges of Baza, Martos, and Alicante. This arm soon became known throughout Europe. The French availed themselves of it at the siege of Puy Guillaume in 1338, and the English had three small guns at the battle of Crécy in 1346. In the French war of independence against the English artillery was much used, and in 1428 Joan of Arc is said to have pointed the guns herself. The guns of the fourteenth century were of the rudest design; in the fifteenth century Charles VIII. of France used an improved artillery in his Italian campaigns; while to this arm, also, Louis XII. largely owed his success in Italy. Henry VII. and Henry VIII. of England did much for its advancement. During the sixteenth century brass guns and cast-iron projectiles were adopted throughout Europe, while Tartaglia in Italy made great improvements in gunnery, and invented the gunner's quadrant. During the latter part of this century case-shot, the German *hagelkugel*, was invented, and shells were fired from mortars. The first half of the seventeenth century forms an era in the history of artillery. Henry IV. of France was among the first to recognize its coming importance, and occupied himself diligently with its improvement. Maurice and Henry Frederick of Nassau made much advancement in it, but it was under the great Swedish warrior, Gustavus Adolphus, that artillery first began to take its true position on the battle-field. He attached two guns to each regiment, and may, therefore, be called the father of the battalion system of guns. He proved its utility in the celebrated Thirty Years' War. During his life he did much to forward the science of artillery, increasing its mobility and its rapidity of fire, and raising the proportion of guns to over 6 for 1000 men. In England, the laboratory at Woolwich was established in 1672, and a reorganization of the artillery took place in 1682, under Lord Dartmouth. Louis XIV. established a special artillery force, raised an artillery regiment in 1671, and in 1690 founded the first artillery schools. The inventions of the elevating screw, the prolonge, and the priming tube filled with powder were made during his reign. The Prussian artillery was very backward during the first part of the eighteenth century, and Frederick the Great did not at first set much value upon its services. Although it contributed much to Frederick's victory at Rossbach, it was usually no match for the well-handled Austrian guns, which fact impressed him with the importance of giving more attention to this branch. He therefore raised the proportion of guns and established horse-artillery in 1759. After the Seven Years' War the Austrians recognized the importance of artillery in modern warfare, and Prince Lichtenstein was commissioned to reorganize it. The experience of Frederick's warfare was best utilized by France, and under Gribeauval, in 1765, great reforms in the French artillery were commenced. This officer had been sent to Austria during the Seven Years' War, and had held command under Prince Lichtenstein. Struck with the improvements effected in Austria, he strove on his return to build up a complete system as to both persons and material, making a separate provision for field, siege, garrison, and coast artillery. At first his reforms met great opposition, but in 1776 he became first inspector-general of artillery, and was able to carry through his improvements. The French horse-artillery dates from 1791, and the last step in the complete organization of the field-artillery was made in 1800, when the establishment of a driver's corps of soldiers put an end to the old system of horsing by contract. Napoleon, who was a great artillery officer, introduced the tactical combination with brilliant success. To his wars we first look for instances of the important effects produced by this arm in that concentration of fire which in those days was produced only by massing guns. Napoleon III. made artillery a special subject of study, and the great treatise commenced and mainly written by him is a standard work on the

subject. Since the war of 1870-71, in which the French artillery proved itself far inferior to the German, the French have been actively engaged in experiments, with a view toward the introduction of superior guns, and have increased their force of artillery by 120 batteries. Similar progress has been made by the other great European powers during this century. The British artillery had greatly deteriorated during the eighteenth century, and was not up to the standard of other countries, but horse artillery was formed in 1790 and a driver's corps introduced the following year. At the beginning of the nineteenth century the Prussian artillery was powerful rather than mobile; but after the disasters of 1806-7 this defect was remedied, and in 1816 further improvement was made.

In 1872 the German artillery was reorganized, the field-artillery of each army corps being augmented and divided into two regiments. The Austrian artillery has always been pre-eminent both in the excellence of its material and in tactical handling on the field. In 1859 rifled guns were introduced; and two years later gun-cotton was extensively used instead of gunpowder, but was soon given up. Russia won special distinction in the Napoleonic wars by the power and good service of its artillery, and, having adopted the breech-loading system of Prussia, has continued to give particular attention to this arm of the service ever since.

The artillery of the Union armies during the civil war was organized by General William F. Barry. The aggregate was about 15,000 field guns, with 40,000 horses and 48,000 men. The number of guns of position used in field-works or intrenched lines during the civil war was 1200, served by about 22,000 men. At present there are five regiments of artillery in the U. S. Army, aggregating 282 commissioned officers and 2650 enlisted men. The First, Second, Third, and Fourth regiments were organized by act of Congress, March 2, 1821, from the corps of artillery formed by act of March 30, 1811; by the consolidation of the First regiment of artillery, organized by act of March 16, 1803; from the two regiments of artillerists and engineers, authorized by act of March 3, 1799; the Second and Third regiments of artillery organized by act of January 11, 1812; the regiment of light artillery organized by act of April 12, 1808, and the Ordnance department, organized by act of February 8, 1815, and merged in the artillery by act of March 2, 1821. The ordnance was separated from the artillery by acts of April 5, 1832, and July 5, 1833. The artillery regimental organization consists of a colonel, a lieutenant-colonel, 3 majors, 12 captains, 26 first-lieutenants and 13 second-lieutenants, 1 sgt. major, 1 quartermaster sergeant, 1 chief musician, 2 principal musicians. The ten heavy batteries to each regiment have 4 officers, 1 first sergeant, 4 sergeants, 4 corporals, 2 musicians, 2 artificers, 1 wagoner, 46 privates—60 aggregate. The two light-batteries have 5 officers, 1 first sergeant, 6 sergeants, 4 corporals, 2 musicians, 2 artificers, 1 wagoner, 49 privates—65 aggregate. This makes 735 men to a regiment. At all posts with fixed batteries, the position of every gun has its number, which is placed on the gun when in position. The guns are mounted in a regular series, commencing with the first gun on the left of the main entrance looking out. The pieces of other batteries are numbered from right to left. On parade or other occasions of ceremony, troops are arranged in the following order: 1st infantry; 2d field-artillery; 3d cavalry. Artillery not mounted, and serving as infantry, is posted as infantry. Captains of the light-batteries are specially assigned, with the approval of the secretary of war, by the commanding general of the army, upon the recommendation of the colonel of the regiment, which is based solely upon the special qualifications of the officer for the command of a school of light artillery. For purposes of instruction, the lieutenants of the artillery regiments pass through the school of light artillery in their respective regiments.

John Owen first cast brass cannon in England in 1535, and a year or two later they were made in Scotland; but long guns for firing shell were not known until 1812, when Colonel Bomford, of the U. S. Army, invented the "Columbiad," which proved very successful. The Dahlgren guns, called after an admiral in the U. S. Navy, were the pattern used by the navy, the Parrot rifles being the most extensively used gun of that type during the war. A few batteries of "Napoleon" guns were used by the army, but as a rule, and particularly with the larger calibers, muzzle-loading and smooth-bores were used, and to-day the sea-coast defenses and the old wooden men-of-war are armed with that class of gun. The result of appointing a mixed board of army and navy officers to inquire into the needs of the country, as far as its armament is concerned, has been the establishment of two completely equipped arsenals for the manufacture of guns and their appliances—one for the army at Watervliet Arsenal, New York, and the other for the navy, at the navy-yard, Washington, D. C. (See ARSENAL.) The latter is the only one in full working order, and the guns already made by it comprise 4-inch, 5-inch, 6-inch, 8-inch, and 10-inch breech-loading steel guns. At first the larger forgings were imported, but a contract made with the Bethlehem Iron Company of Bethlehem, Pa., induced that firm to modernize and extend its plant, so that all later forgings are entirely of domestic steel. The body of the modern rifle is made of a solid steel ingot, which is bored and turned; over the rear portion is shrunk a cylinder of steel, and steel rings or hoops are shrunk over the jacket and over the tube to the muzzle. The standard muzzle velocity of these guns is 2000 foot seconds but it can easily be increased to 2100 foot seconds without undue strain on the gun. The twist of

the rifling is one turn in 25 calibers, giving greater steadiness in flight and the power to use, if so desired, longer projectiles than could otherwise be employed. The larger guns are now being made 35 calibers long. The service breech mechanism is on the slotted screw principle, and for the smaller guns the Driggs-Schroeder system has also been adopted. The 4-inch rapid-fire gun is the most recent advance that has been made, and several of this type are undergoing experiments. See **ORDNANCE FABRICATION ; MACHINE GUNS ; ORDNANCE ; RAPID-FIRE GUNS ; BREECH-LOADING ARMS.**

ARTILLERY COMPANY, HONORABLE, is the oldest existing volunteer corps in Britain. Four military bodies—the *A. C.*, the *Sergeant-at-Arms*, the *Yeomen of the Guard*, and the *Gentlemen Pensioners*, were established as far back as the time of the Tudors; they all still exist, but under greatly altered circumstances. In 1537, Henry VIII. granted a patent to three persons, appointing them "overseers of the science of artillery," for long-bows, cross-bows, and hand-guns. They were to constitute a guild or fraternity for this purpose, with power to appoint assistants and successors, to purchase lands, and to use a common seal; and their formal official name became "The Masters, Rulers, and Commonalty of the Fraternity or Guild of Artillery of Long-bows, Cross-bows, and Hand-guns." The freemen of the guild or company were empowered to keep arms, and to exercise themselves in shooting. In 1605 a patent was granted by James I., intended chiefly to effect the preservation of the shooting and practising grounds around London, for the *A. C.* In 1633 a commission was appointed by Charles I., still further to insure this object. In 1638 the corporation of the city of London presented to the company the plot of ground ever since called the artillery ground, near Moorfields, as a field for military exercise. Royal princes frequently enrolled themselves as members of the company, usually as "captain-general." In 1719, George I. issued an order that all commission and staff officers of the city train-bands (a metropolitan militia) should become members of the *A. C.*, and exercise with the other members at all convenient times. The word "artillery" had heretofore been considered as applying to bows and arrows as well as to firearms; but the members of the company, like other marksmen, had almost abandoned archery, without, however, making any change in their designation. In a summons to the company to meet for exercise on a particular day in 1682, it is said: "Those gentlemen that on that day handle muskets are desired to take care that their arms are clean and well fixed, and that they bring with them fine dry powder, and even match." The company, like many other city guilds, has nearly outlived its original purpose. In 1780, when the "Lord George Gordon riots" afflicted the metropolis, the members of the *A. C.* effectually protected the bank of England; in 1848, when Chartist riots were apprehended, the company was on the alert to render good service if needed; and in the spring of 1859, when an uneasy feeling prevailed in England concerning the designs of France, the members polished their arms and looked forward to eventualities; but the company has never been engaged in actual warfare with an enemy.

The *A. C.* consists of members elected by ballot, who pay two guineas annual subscription, and supply themselves with dress, but not with arms, etc. These payments, together with the rental received from some real property, constitute the fund out of which the expenses are defrayed. The members learn rifle-shooting as well as artillery practice; there are certain days of meeting at Moorfields; and every summer there are certain days of drill and practice at Seaford. The corps comprises six infantry companies, a grenadier company, a light-infantry company, a rifle company, and an artillery company. Until 1849, the members elected their own officers; but since that year the crown has appointed them on the nomination of the lieutenantancy of the city of London. The lieutenant-colonel appoints the non-commissioned officers.

ARTILLERY COMPANY, THE ANCIENT AND HONORABLE, of Boston, the first regularly organized military company in America, formed in 1637 and copied from the Honorable Artillery Company of London, dating from 1537. The Boston company was chartered June, 1638, has always been vigorously sustained, and is noted for the eminent citizens in its membership. It has an annual parade, sermon, and dinner, formal and dignified. Elaborately illustrated histories of the company have been published.

ARTILLERY CORPS. The introduction of artillery caused a great revolution in the methods and tactics of the day, as it was quickly recognized that an army should form in order of battle at a much greater distance from the enemy than in former times. As the clumsy old guns, with their heavy carriages, were replaced by others lighter and more easily handled, it became possible to move them about more quickly from place to place. This was followed by the setting apart of a body of troops whose duties were entirely with the artillery, and who were not included as a component part of the regular army, until the Germans, during the Thirty Years' War, saw the advantages to be gained by bringing the two portions of the army together. Gustavus Adolphus in Sweden, Frederick II. in Prussia, and Napoleon I. in France all attached a very high degree of importance to the artillery arm, and to-day its value is recognized to such a degree that some authorities practically give it precedence over cavalry and infantry. When military men speak of the field artillery, they usually include the guns, carriages, horses, ammunition, and stores of every description, as well as the artillerymen. The distinc-

tion between heavy and light artillery depends on the size of the cannon and the weight of the shot and shell propelled from them. In most European states, the artillerymen are divided into regiments, battalions, brigades, and companies. In England the whole form one enormous regiment, which is expanded or contracted according to the exigencies of the service. In the U. S. there are five separate regiments broken up into detachments of various size, according to the post to which they are assigned. There are twelve batteries to each regiment, two of the number being light batteries. The five regiments aggregate 3,675 men and 283 officers. The color of the facings and trimmings of the artillery uniform is red. A well-appointed field force should have, according to the best authorities, 3 pieces of artillery to 1000 infantry.

ARTILLERYMAN. See **ARTILLERY CORPS.**

ARTILLERY, PARK OF, is a collective name given to the whole of the guns, carriages, ammunition, and other appurtenances essential to the working of siege or field A. Besides reserve guns and carriages, there belong to it the ammunition wagons, as well for the infantry and cavalry as for the A., the implements and materials necessary for repairing and completing equipments, harness-stores, field-forges, laboratories, and (in some armies) transport and provision wagons. The *personnel* of a park of A. consists of A. officers, non-commissioned officers, and artillerymen; besides a large number of smiths, wheelwrights, saddlers, armorers, drivers, and other mechanics and laborers. Sometimes the term is applied to the place selected, as well as to the vast military stores collected there. During a siege, the park of A. is stationed out of reach of the enemy's fire, but in communication with the besiegers' trenches. If possible, its locality is chosen close to some good line of communication, either road or river. All pioneering or intrenching tools, and all handicraft implements, are arranged in rows nearest to the field of action, with requisite spaces for the convenience of the storekeepers and workmen. Behind these are the materials for erecting batteries, making fascines and gabions, and filling sand-bags. Furthest removed from the enemy are the magazines, in and near which shot and shell and other kinds of ammunition are stored. A large park of A. is usually divided into park-columns, for the sake of better supervision. Under some circumstances, the engineering park is distinct from the park of A., especially where these two arms of the service are mutually independent.

ARTILLERY, SCHOOL OF. This school, established at Fort Monroe, Virginia, constitutes an independent command, from which all reports and returns are made direct to the headquarters of the army. It is governed by special regulations, modified from time to time, as may be necessary. The school has the following organization: 1. Three field-officers of artillery—the senior to command the post and school, the others to be superintendents of instruction. The officers constitute the staff of the school. 2. At least five batteries of artillery—one from each regiment of artillery, and such other officers and enlisted men as may be ordered to the school for instruction. These batteries form the instruction batteries of the foot artillery. 3. An adjutant of the post, who is secretary of the staff and records its proceedings. The lieutenants of the instruction batteries are relieved and replaced by others on the first of each alternate September. Details for instruction are, as far as possible, made in the order of rank, by roster, first from non-graduates of the Military Academy who have not already served at the school, and then from graduates from the military academy who have not served at the school. The first military school was established in 1823, but was discontinued six years later. A second attempt was made in 1858, but was stopped by the war breaking out in 1861. The present school was started in 1867. Instruction is both theoretical and practical, and the two years' course is closed by an examination before a board of officers especially appointed for the purpose. France, Germany, England, and Italy have artillery schools, some of which have been established for over two hundred years. In some of the countries the artillery and engineers' schools are combined, but in most of the European states a separation of the two arms of the science is made. The studies comprise mathematics, physics, chemistry, field and permanent fortifications, garrison warfare, field tactics, electricity, law, military history and topography, surveying, sketching, and so forth. The practical exercises include the serving and firing of the various types of guns, laying out and constructing field-batteries, work in the laboratory and artillery workshops.

ARTILLERY TACTICS. See **TACTICS, MILITARY.**

ARTIODACTYLES, even-toed, herbivorous animals, a division of the *ungulata*, or hoofed, as the cow, sheep, camel, etc.; and some omnivora, as the hog.

ARTOCARPACEÆ, a natural order of dicotyledonous plants, of which the bread-fruit (*artocarpus incisa*) is the type; very nearly allied to that of *moraceæ* (mulberries, figs, etc.), and, like it, by many botanists regarded as a sub-order of *urticaceæ* (nettles, etc.). The botanical distinction between *artocarpaceæ* and *moraceæ* lies chiefly in the straight embryo and large cotyledons of the former. The fruit is often a *sorosis* (a single succulent fruit formed of the aggregated germens of a whole spike of flowers), as in the case of the bread-fruit (q.v.). There are upward of 50 known species, natives exclusively of the tropics. The milky juice of some yields india-rubber (q.v.); and that

of a few species is so bland as to be used as a substitute for milk (see COWTREE). The juice of others is, however, very poisonous, as that of *antiaris toxicaria* the Antjar poison, one of the poisons called upas by the Javanese. The fruits are always wholesome: and the seeds of the *musanga* of the Gold coast of Africa, and of *brosimum alicastrum* in the West Indies, are eaten as nuts. The fibrous bark of the bread-fruit tree is made into cloth in the South Sea islands, and that of other species of *artocarpus* is capable of being used in the same way. The bark of *antiaris* or *lepurandra saccidora* is used in western India for making sacks, which are formed by cutting a branch of the dimensions of the sack wanted; and simply turning back and drawing off the bark after it has been soaked and beaten, the wood being sawn off so as to leave a little portion to form the bottom of the sack. The fibrous bark of *cecropia peltata*, or trumpetwood, is used for cordage in tropical America. The stem and branches are very hollow, and are used for wind-instruments. The wood of some species is valuable, as that of the *brosimum* or *piratinera guianensis*, the snake-wood of Demerara. See LETTER-WOOD.

ARTOIS was formerly a province of France, bounded by Flanders and Picardy, and almost corresponding with the modern department of *Pas-de-Calais* (q.v.). The capital of A. was Arras. Louis IX., in 1239, made A. a county, and gave it to his brother Robert, who was succeeded by his son, Robert II., surnamed Posthumous, who died in 1302. Afterwards it passed into the hands of Flanders and Burgundy, but was ceded to France by treaties in 1659 and 1678. Charles X., in his early life, and also after his abdication, was known by the title of count d'Artois.

ARTOIS, or **ARTHOIS**, JACQUES D', 1613-1665; a Flemish painter of realistic landscapes and compositions of large size, executed with much poetic feeling.

ARTS, DEGREES IN. The term "A.," or "liberal A.," as technically applied to certain studies, came into use during the middle ages, and on the establishment of universities, the term "faculty of A." denoted those who devoted themselves to science and philosophy, as distinguished from the faculty of theology, and afterwards of medicine and law. The number of "A." embraced in the full medieval course of learning was seven: grammar, logic, rhetoric (constituting the *trivium*), music, arithmetic, geometry, and rhetoric (the *quadrivium*). The terms master and doctor were originally applied synonymously to any person engaged in teaching. In process of time, the one was restricted to the liberal A. the other to divinity, law, and medicine. When regulations were established to prevent unqualified persons from teaching, and an initiatory stage of discipline was prescribed, these terms become significant of a certain rank, and of the possession of certain powers, and were called *gradus*, "steps" or "degrees." The passing of the initiatory stage, said to have been first instituted by Gregory IX. (1227-41), conferred the title of *bachelor* (q.v.), and an additional course of discipline and examination was necessary to obtaining that of *master*. The title of master of A. originally implied the right, and even the duty of publicly teaching some of the branches included in the faculty of A.; a custom which is still retained, to some extent, in the German universities, but has fallen into disuse in Britain and France, where the title is nearly honorary. The subject will be more fully considered under the general head of DEGREE.

ARUM, a genus of monocotyledonous plants, belonging to the natural order *araceæ* or *aroidæ*. This order consists of herbaceous plants, some of which are stemless, and shrubby plants, some of which are arborescent, and some climb by aerial roots, clinging to the trees of tropical forests. The leaves are sheathing at the base, convolute in bud, usually with branching veins. The flowers are male and female, naked, arranged upon a *spadix*, which is generally inclosed in a *spathe* (q.v.); the male flowers at the upper part of the spadix, and the female flowers at its base. The stamens are definite or indefinite in numbers; the anthers sessile, or nearly so, and turned outwards. The ovary is free, generally one-celled, many-seeded; the stigma sessile. The fruit is succulent, the seeds pulpy, the embryo in the axis of fleshy or mealy albumen, with a lateral cleft in which the plumule lies; the albumen, however, is wanting in some plants of the order.—As thus defined, this order contains almost 200 known species, natives chiefly of tropical countries, but some of the herbaceous kinds belong to colder climates.—The limits of the order are, however, sometimes extended, so that it includes as sub-orders *typhaceæ*, *pistiaceæ*, etc.—The genus A. has a convolute spathe; the spadix naked at the point. In some species, a stench like that of carrion is produced during flowering, as well as a remarkable heat. Flowers, in general, are slightly warmer than the air around them, the heat being produced by the union of oxygen with some starch-like ingredient in the sap of the petals, or other parts of the flower; for flowers, instead of absorbing carbonic acid gas and giving off oxygen in the sunshine, like the leaves of plants, absorb oxygen and give off carbonic acid, like the lungs of animals. But flowers, in general, are only one degree, or one degree and a half, warmer than the air, whereas the flowers of some of the arums and nearly allied plants are sensibly warm to the touch, and that of *A. cordifolium* has been found to have a heat of 121° F., while that of the air was only 66° F.—The only British species is *A. maculatum*, CUCKOW-PINT or WAKE-ROBIN, which is abundant in England and in most parts of Europe, growing chiefly in moist shady woods and under hedges. It has a tuberous perennial root; its leaves are all radical, on long stalks, strongly arrow-shaped, often spotted; the spathe greenish yellow, inclosing a rather short violet or brownish red spadix. It produces scarlet berries, 1 or 2 seeded, about the size of peas, clustered upon the spadix. The root has a burning acrid taste, which,

however, it loses in drying or boiling. In a fresh state, it is a drastic purgative, too violent for medicinal use; and, indeed, it, as well as the leaves, is an active poison; yet a nourishing farina is prepared from it, after the acrid juice has been removed. This farina is a pure starch, and is known in England by the name of Portland sago or Portland arrow-root. It was formerly prepared to a considerable extent in the isle of Portland, where also the tubers (corms) themselves are eaten by the country people. A cosmetic, called cypress powder, is made from them in France, and they are used in Switzerland as a substitute for soap. They contain, indeed, a quantity of *saponine*, to which their acidity is supposed to be owing. They lose great part of their acidity in drying, and were formerly used in medicine as a stimulant in impaired digestion, a diuretic in dropsies, and an expectorant in chest complaints. The plant is extensively cultivated in India for food.—*A. indicum* is also much cultivated in Bengal for its esculent stems and small pendulous tubers.—Acridity in the juice, and the presence of an amylaceous substance of very nutritious quality, from which the acrid juice is easily separated, are characteristics of many plants of this order, particularly species of *caladium* and *colocasia*, much used for food in warm countries, under the names *cocco* (q.v.), *EDDOES*, etc.—*Amorphophallus campanulatus* (*A. campanulatum*), called *OL* by the Bengalese, is very much cultivated in some parts of India for its roots (flat underground corms), which form a very important article of food; yet in a fresh state it is so acrid that it is employed as an external stimulant, and is also used as an emmenagogue. Other species of *amorphophallus* are still more powerfully stimulant.—Two large species of *arisema*, another genus very closely allied to *A.*, were found by Dr. Hooker to afford food to the inhabitants of the Sikkim Himalaya at an elevation of upwards of 10,000 ft. Their tuberous roots are bruised by means of wooden pestles, and thrown into small pits with water, until the commencement of acetous fermentation, when the acidity is mostly dissipated; but the process is so imperfect, that cases of injury from the poisonous juice are frequent. The tubers of *arisema atrorubens* (*A. triphyllum* of Linnæus), a native of the United States, and there known as dragon-root and Indian turnip, yield a pure white starch like that of *A. maculatum*. Their medicinal uses are also similar; they are employed as a stimulant of the secretions.—The DRAGON-PLANT, *A. dracunculus*, a native of the south of Europe, is not uncommon in gardens in Britain, although it has a carrion-like smell, and its emanations are apt to produce headache and other disagreeable effects. It has a singular appearance—straight stalks, 3 ft. high, curiously spotted like the belly of a snake.—The peculiar acidity of the *araceæ* is most remarkably displayed in the dumb cane (q.v.).

A RUN, a river rising in St. Leonard's forest, in the middle of north Sussex, and after a course of 35 m. falling into the English channel. A canal unites it with the Wey, a feeder of the Thames.

AR UNDEL, a small t. 5 m. inland from the mouth of the Arun, in a tertiary and chalk district, on the s. side of the South Downs, in the s.w. of Sussex. It consists mainly of a very steep street rising from the right bank of the Arun to the summit of a hill crowned by a castle. The Arun is navigable for vessels of 150 tons up to the town. Bark and timber are the chief exports. Pop. in '91, 2644. A. was disfranchised by the reform bill of 1867. It is governed by a mayor, 4 aldermen, and 12 councilors. The castle, from its site, is a striking object, and was built soon after the Norman conquest. It is an oblong, including 5½ acres within its walls. It was laid in ruins during the civil wars of Charles I., but, being the baronial residence of the dukes of Norfolk, the late duke restored it to its former Gothic magnificence. The keep, containing the dungeon, is a circular Norman tower of imposing strength.

AR UNDEL, THOMAS, archbishop of Canterbury in the reigns of Richard II., Henry IV., and Henry V., b. in 1353, was the second son of Robert Fitz-Alan, earl of Arundel and Warren. He was first archdeacon of Taunton, and at the early age of 21, he was, by the pope's appointment, consecrated bishop of Ely. In 1388, he was, by the same authority, transferred to the archiepiscopal see of York. He was also for some years lord high chancellor of England. Having been banished the kingdom for taking a leading part in the first attempt which was made to deliver the nation from the oppression of Richard II., he was honorably received at Rome, and by pope Boniface IX. nominated archbishop of St. Andrews, with a promise of future preferment in England. In 1396, he was enthroned, with great pomp, as archbishop of Canterbury. He was a bitter persecutor of the Lollards and followers of Wickliffe, and a chief instrument in procuring the horrible act for the burning of heretics (*de heretico comburendo*), passed in the reign of Henry IV. He even carried his bigotry so far as to solicit from the pope a bull, for digging up Wickliffe's bones, which, however, was wisely refused him. He also procured a synodal constitution, which forbade the translation of the Scriptures into the vulgar tongue. Amongst others whom he caused to be convicted of heresy, and sentenced to the flames, was Lord Cobham, one of the principal patrons of the new sect, at the commencement of the reign of Henry V. Soon after, A. was seized with an inflammation in the throat, which proved fatal. He d. 20th Feb., 1413.

AR UNDEL MARBLES, part of a collection of ancient sculptures, formed about the beginning of the 17th c. by Thomas Howard, earl of Arundel, and presented in 1667 to the university of Oxford, by his grandson, Henry Howard, afterwards duke of Norfolk.

The principal portion of it is the "Parian chronicle," consisting of the fragments of an inscription in marble, supposed to have been executed in the island of Paros, about 263 B.C. In its perfect state, this inscription contained a chronological table of the principal events in Grecian history from the time of Cæcrops (1582 B.C.) to the archonship of Diognetus (264 B.C.). The chronicle of the last 90 years is lost, and the extant portion of the inscription is much corroded and defaced. This curious and interesting monument, the authenticity of which has been questioned and vindicated with almost equal ingenuity and learning, was purchased for the earl of Arundel, along with many other relics of antiquity, at Smyrna, by Mr. (afterwards Sir William) Petty. The inscription, and all the other principal sculptures in the Oxford collection, are to be found fully illustrated in the relative publications of Selden, Prideaux, Maittaire, and Chandle., under the various titles of *Marmora Arundelliana* and *M. Oxoniensia*.

The nobleman whose name is associated with these ancient marbles is worthy of remembrance, independently of his general merits, as the first of his order in England who liberally encouraged the fine arts, and communicated the influence of his own taste and enthusiasm in their cultivation to a wide circle of imitators and successors.

ARUNDO. See REED.

AR VAKR ("early awake"), in Norse mythology one of the horses of the sun; the other was called Alsvið, "all scorching."

ARVAL BROTHERS, a priesthood of 12 members anciently elected for life from the highest ranks in Rome, and including the emperor when there was one. Their duty was to offer yearly public sacrifice for the fertility of the fields, and the custom is said to have originated with Acca Larentia, foster-mother of Romulus, who, with her twelve sons, instituted such a festival. Another legend is that the foster-mother lost one of her sons, and Romulus permitted her to adopt him in his place, calling the twelve "fratres Arvales." Though little is said of the A. B. by Roman orators, their records up to a high antiquity, as given by themselves, were inscribed on stone. The college consisted of a master, vice-master, flamen, prætor, and eight members; and among their attendants were four boys, who were required to be sons of senators, and to have living parents. Each officer wore a wreath of green, a white fillet, and a white toga bordered with purple. The great annual festival under their charge was in honor of Dea Dia, who seems to have resembled the goddess Ops, wife of Saturn. It occupied three days, between the middle and end of May. On the first day was the ceremony of "touching" samples of old and young grain; on the second day the sacrifice of two white pigs, a cow, and a fat sheep, in a sacred grove beyond the city, followed by blessing, or "touching," samples of grain brought by the people, and after that the dance and song of brotherhood in the temple, and the election of officers for the coming year. On the third day there was a sacrifice in the city. The minor duties of the brothers were to offer sacrifice on the birthday of an emperor, or at the beginning of a consulate, or for escape from danger, or at the starting or ending of a journey, or on occasion of any important event touching the imperial family. On the 3d of Jan. they recited a particular form of prayer for the ruling emperor, and made sacrifice to the male and female deities.

ARVERS, ALEXIS FÉLIX, a French poet and dramatic writer, was born in 1806; was educated at the Collège Charlemagne, where he was graduated with honor in 1825, and devoted himself to the law, which he afterwards abandoned for poetry and the drama. He died in 1850. A volume of his poems containing the well-known sonnet usually cited as the *Sonnet d'Arvers*, and beginning with the words, *Ma vie a son secret, mon âme a son mystère*, was published in 1833, under the title, *Mes Heures Perdues*. Among his dramatic works are *Deux Maîtresses*, *Rose et Blanche*, *Suzon et Suzanne*, *les Deux César*, *la Femme de Marbre*, *Lord Spleen*, *le Banquet de Camarades*. He wrote, in conjunction with other dramatists, *les Vieilles Amours*, *En Attendant*, *les Dames Patronesses*, *le Beau Martial*, *les Anglais en Voyage*, and other plays.

ARVICOLA. See VOLE.

ARYAN RACE, ARYAN LANGUAGES. The name Aryan (less properly, Arian) race or Aryan family of nations is now generally used to designate that ethnological division of mankind otherwise called Indo-European or Indo-Germanic. It consists of two branches, geographically separated, an eastern and a western. The western branch comprehends the inhabitants of Europe, with the exception of the Turks, the Magyars of Hungary, and the Finns of Lapland (see EUROPE); the eastern comprehends the inhabitants of Armenia, of Persia, of Afghanistan, and of northern Hindustan (see HINDUSTAN). The evidence on which a family relation has been established among these nations is that of language. Between Sanscrit (the mother of the modern Hindu dialects of Hindustan), Zend (the language of the ancient Persians), Greek (which is yet the language of Greece), Latin (the language of the Romans, and the mother of the modern Romanic languages, i.e., Italian, French, Spanish, Portuguese, Wallachian), Celtic (once the language of great part of Europe, now confined to Wales and some parts of Ireland and Scotland), Gothic (which may be taken as the ancient type of the Teutonic or Germanic languages—including English—and of the Scandinavian), and Slavonic (spoken

in a variety of dialects all over European Russia and a great part of Austria), the researches of philology have within the present century established such affinities as can be accounted for only by supposing that the nations speaking them had a common origin. No one of these nations, whether existing or historical, can claim to be the parent nation of which the others are colonies. The relation among the languages mentioned is that of sisters—daughters of one mother, which perished, as it were, in giving them birth. No monuments of this mother-language have been preserved, nor have we any history or even tradition of the nation that spoke it. That such a people existed and spoke such a tongue is an inference of comparative philology, the process of reasoning being analogous to that followed in the kindred science of geology. The geologist, interpreting the inscriptions written by the finger of nature herself upon the rock-tablets of the earth's strata, carries us back myriads of ages before man appeared on the scene at all, and enables us to be present, as it were, at creation itself, and see one formation laid above another, and one plant or animal succeed another. Now languages are to the ethnologist what strata are in geology; dead languages have been well called his fossils, and petrifications. By skillful interpretation of their indications, aided by the light of all other available monuments, he is able to spell out, with more or less probability, the ethnical records of the past, and thus obtain a glimpse here and there into the gray cloud that rests over the dawn of the ages.

When these linguistic monuments are consulted as to the primitive seat of the Aryan nations, they point, as almost all ethnologists are agreed, to Central Asia, somewhere probably east of the Caspian, and north of the Hindu Kush and Paropamisian mountains. There, at a period long anterior to all European history—while Europe was perhaps only a jungle, or, if inhabited at all, inhabited by tribes akin to the Finns, or perhaps to the American Indians—dwelt that mother-nation of which we have spoken. From this center, in obedience to a law of movement which has continued to act through all history, successive migrations took place towards the north-west. The first swarm formed the Celts, who seem at one time to have occupied a great part of Europe; at a considerably later epoch came the ancestors of the Italians, the Greeks, and the Teutonic peoples. All these would seem to have made their way to their new settlements through Persia and Asia Minor, crossing into Europe by the Hellespont, and partly, perhaps, between the Caspian and the Black sea. The stream that formed the Slavonic nations is thought to have taken the route by the north of the Caspian. At a period subsequent to the last north-western migration, the remnant of the primitive stock would seem to have broken up; part poured southwards through the passes of the Himalaya and Hindu Kush into the Punjab, and became the dominant race in the valley of the Ganges; while the rest settled in Persia, and became the Medes and Persians of history.

It is from these eastern members that the whole family takes its name. In the most ancient Sanscrit writings (the Veda), the Hindus style themselves Aryans; and the name is preserved in the classic Aarii, a tribe of ancient Persia, Aria, the modern Herat, and Ariana, the name of a district comprehending the greater part of ancient Persia, and extended by some so as to embrace Bactriana, Ariana, or Airyana, is evidently an old Persian word, preserved in the modern native name of Persia, Airan, or Iran. *Arya*, in Sanscrit, signifies "excellent," "honorable," being allied probably to the Greek *aristos* (stos), the best. Others connect it with the root *ar* (Lat. *arare*, to plough), as if to distinguish a people who were tillers (*earers*) of the earth from the purely nomadic Turanians or Turks.

The several members of this ethnological group will receive special notice each in its place. As to the hypothetical mother-nation—the primitive Aryan stock before separation, it might seem impossible to affirm anything beyond its mere existence and locality. But the ethnologist does not content himself with this. In an admirable essay on *Comparative Mythology* (Oxford Essays, 1856), Prof. Max Müller has drawn a picture of the Aryan family while yet one and undivided, in which the state of thought, language, religion, and civilization is exhibited in a multitude of details. Where the same name for an object or notion is found used by the widely spread members of a family, it is justly inferred that that object or notion must have been familiar to them while yet resident together in the paternal home. It is in this way established, that among the primitive Aryans not only were the natural and primary family relations of father, mother, son, daughter, hallowed, but even the more conventional affinities of father-in-law, mother-in-law, sister-in-law; that to the organized family life there was superadded a state organization with rulers or kings; that the ox and the cow constituted the chief riches and means of subsistence; and that houses and towns were built.

One general observation made by Müller is so interesting that we take the liberty of quoting it entire. "It should be observed," he says, "that most of the terms connected with chase and warfare differ in each of the Aryan dialects, while words connected with more peaceful occupations belong generally to the common heirloom of the Aryan language. The proper appreciation of this fact in its general bearing will show how a similar remark made by Niebuhr, with regard to Greek and Latin, requires a very different explanation from that which that great scholar, from his more restricted point of view, was able to give it. It will show that all the Aryan nations had led a long life of peace before they separated, and that their language acquired individuality and nationality as each colony started in search of new homes—new generations forming new

terms connected with the warlike and adventurous life of their onward migrations. Hence it is that not only Greek and Latin, but all Aryan languages have their peaceful words in common; and hence it is that they all differ so strangely in their warlike expressions. Thus the domestic animals are generally known by the same name in England and in India, while the wild beasts have different names, even in Greek and Latin."

In this mainly pastoral life, the more important of the primitive arts were known and exercised: fields were tilled; grain was raised and ground into meal; food was cooked and baked; cloth was woven and sewn into garments; and the use of the metals, even of iron, was known. The numbers as far as a hundred had been named, the decimal principle being followed. The name for a thousand had not come into requisition until after the dispersion, for it differs in the different Aryan tongues.

Finally, it was among the yet undivided Aryans, while abstract language did not yet exist, while every word was a metaphor, and the setting of the sun, for example, could only be expressed by his growing old and dying, that those stories of gods, heroes, and monsters originated, which, with more or less of variety, but still with a family-likeness, formed the pagan mythology of every member of the group. See PALEOGRAPHY.

ARZACHEL, ABRAHAM, a Spanish Hebrew astronomer of Toledo, who lived about 1060. He determined the apogee of the sun, and wrote on the obliquity of the ecliptic. It is said that his works were in part the foundation of the Alphonsine tables, made by order of Alphonso X. of Castile.

ARZIGNA NO, a t. of north Italy, 11 m. w. by s. from Vicenza, in a plain surrounded by hills. It manufactures woollens, leather, and silk twist.

AS was the designation both of a Roman weight (called also *libra*) corresponding very nearly to an English *pound* (q.v.), and also of a coin made of the mixed metal *aes*, or bronze. The A. (coin) originally no doubt weighed a (Roman) pound; but it was gradually reduced to $\frac{1}{16}$ of a pound, and even lower. It is thus difficult to assign any fixed value to the A. About 270 B.C., the denarius (= 17c.) contained 10 asses; so that the value of the A. was then a little more than $\frac{1}{4}$ of a cent; when 16 asses went to the denarius, the value was about one cent. It was by the *sestertius* (q.v.) that money was reckoned at Rome. The oldest form of A. usually bore the figure of an ox, a sheep, or other domestic animal (*pecus*); from which it is usually supposed that the Latin word for money, *pecunia*, is derived.

ASA, son of Abijah, and grandson of Rehoboam, was the third king of Judah. At the beginning of his reign, he was very young, and his character apparently undeveloped, for he allowed his grandmother, Maachah, to encourage idolatry; but on assuming the reins of government, one of his earliest acts was to remove her from all authority "because she had made an idol in a grove" (1 Kings, xv. 13; 2 Chron. xv. 16). His zealous efforts to extirpate the vices and impieties of the people were on the whole successful. He took away the Sodomites out of the land, and the altars of the strange gods, broke the images, and cut down the groves. For the next ten years, he devoted himself to strengthening the defenses of his kingdom, and organized a magnificent army of more than half a million, which seems to have been looked upon as a menace by other monarchs, for one of these, Zerah the Cushite, took the initiative, and penetrating through *Arabia Petraea*, invaded Judah, but was defeated with immense slaughter. Before the battle commenced, A. had invoked the aid of Jehovah; and some time after the victory, he and all his people entered into a solemn covenant "to seek the Lord God of their fathers with all their heart and with all their soul" (2 Chron. xv. 12). Peace lasted for twenty years in the kingdom, but in the 35th year of A.'s reign, war again broke out between him and Baasha, king of Israel. He sought and obtained the aid of the Syrian monarch, Benhadad, but at the expense of "the treasures of the house of the Lord;" and although successful against his adversary, he was indignantly upbraided and threatened by the prophet Hanani for not relying on Jehovah alone. A., flushed with success, threw the prophet into prison, and, it would appear, "in his rage" oppressed some of the people at the same time—perhaps those only who sided with Hanani, for we know that at his death the nation honored him with a splendid funeral; and the sacred historian pays the highest tribute to his memory, declaring that "A.'s heart was perfect with the Lord all his days." He reigned from 955 to 914 B.C.

ASA DULCIS (i.e., sweet Asa), a drug in high repute among the ancients as an antispasmodic, deobstruent, and diuretic; also for supposed virtues of the most extraordinary kind, such as neutralizing the effects of poison, curing envenomed wounds, restoring sight to the blind, youth to the aged, etc. Its value was estimated by its weight in gold. The princes of Cyrene caused a figure of the plant producing it to be struck on the reverse of their coins, and it was sometimes called *laser cyrenaicum*. The plant is of the genus *thapsia* (of the natural order *umbellifera*), either *T. garganica*, or a nearly allied species, *T. silphium*—perhaps the drug was produced by both. They are natives of the s. of Europe and of Barbary, and appear to be very active purgatives.

ASAFETIDA, or ASSAFETIDA (i.e., fetid asa or assa), is a gum-resin, which has been supposed to be identical with the exuded juice of the *silphion* of Dioscorides, so highly esteemed among the Greek physicians; but which, perhaps, was rather the *asa*

dulcis. Its name is derived from the Persian word *asa*, which means *a staff*. This drug is brought from Persia and Afghanistan, and is procured by drying the milky juice which flows from the root of the plant *ferula* (*narthex*) *A.*, which has been referred to the genus *ferula* by Linnæus, and to *narthex* by Dr. Falconer. The root of the *A.* plant is long, and generally undivided; white inside, but having a black covering; and contains in its interior a quantity of juice of an overpowering odor, which much resembles that of garlic. *Ferula* or *narthex A.* has its radical leaves tripartite, their segments bipinnatifid, and nearly 2 ft. in length. The gum-resin is said by some to be obtained also from *ferula persica*, a plant which has the root-leaves very much divided, and all either tripinnate or quadripinnate. The name *ferula*, like the Persian *asa*, refers to the appearance of the stem of the plant. *Ferula persica* has long been propagated successfully in Britain, and even brings its seeds to perfection.

A. is prepared in the dry southern provinces of Persia, but chiefly in Khorassan and Afghanistan, and also to the n. of the Hindu Kush range of mountains. About April, the root-leaves are taken away, and the root itself is more or less exposed by removal of the soil from about it. After a lapse of six weeks, a slice is cut horizontally from its summit, and a thick white juice exudes, the smell of which even exceeds in strength that of the drug when dry.

The drug is sometimes met with in the market in the form of tears, but more frequently in lumps, which are made up of irregularly shaped tears, agglutinated together by a softer substance. *A.* is extensively used in medicine, and possesses stimulant and anti-spasmodic properties. When taken internally, it undergoes absorption, and may be detected in almost every secretion of the body, as the saliva, breath, and urine. According to the analysis of Pelletier, *A.* is composed of the following substances: resin, 65 parts; volatile oil, 3.6; gum, 19.44; bassorin, 11.66; various salts, .30. In many parts of the east, this drug is used as a condiment, in which respect it seems to take the place of the garlic of some European nations.

A'SAPH, ST., a cathedral city and a station on the Vale of Clwyd railway, stands on a small hill between the rivers Clwyd and Elwy, in the n.w. of Flintshire, Wales. The cathedral is a cruciform building, 178 by 68 ft., and was built in 1284 on the site of a wooden structure founded before 596. It has a tower 93 ft. high, is one of the smallest of British cathedrals, and stands on the top of the hill on which the city is built. Kentigern, or St. Mungo, bishop of Glasgow, and his disciple, St. A., are said to have founded the see of St. A. in the 6th century. The bishop, who has a revenue of £4200, is patron of 121 of the 148 benefices in the diocese. Pop. in 91, 13,993. St. A., with the Flint district of boroughs, returns one member to parliament.

A'SAPHUS. See TRILOBITE.

ASARABAC'CA (*a'sarum europæum*), a plant of the natural order *aristolochiaceæ* (see ARISTOLOCHIA), a native of Europe, growing in woods; rare, and perhaps not truly indigenous, in Britain. The whole plant has acrid properties; the roots and leaves are aromatic, purgative, and emetic. The use of *A.*, however, as an emetic has been much superseded by that of ipecacuanha, which is milder and safer. The powdered roots and leaves enter into the composition of cephalic snuffs, which cause sneezing, and are employed as a counter-irritant in cases of headache, ophthalmia, toothache, etc. The plant contains a volatile oil, and a crystalline substance called *asarine*, to which it seems to owe its active properties. The genus *asarum* is distinguished by twelve horned stamens, distinct from each other and from the style, and by a bell-shaped three-lobed perianth. *A. europæum* has a very short stem with two shining kidney-shaped leaves on long stalks, from the axel of which springs a single drooping greenish-brown flower. —A nearly allied species, *A. canadense*, a native of Canada, is stimulant and diaphoretic, and is used under the name of CANADA SNAKEROOT, instead of *aristolochia serpentaria*. It is also called WILD GINGER, and used as a spice, being of a warm aromatic quality, and not acrid, like its European congener.

AS'BEN. See AIR.

ASBESTOS, a mineral very closely allied to tremolite, actinolite, and hornblende, and which, along with tremolite and actinolite, is often ranked among the varieties of hornblende. It consists chiefly of silica, magnesia, lime, and oxide of iron, and is of a fine fibrous character, the fibers sometimes combined together in a compact mass, sometimes easily separable, elastic and flexible. It is generally of a whitish or greenish color. The variety called *rock-cork* very much resembles cork, is soft and easily cut, and so light as to swim in water. *Rock-leather* and *rock-wood* are varieties somewhat similar to rock-cork, but not so light. The finest fibrous variety with easily separable fibers is called *amianthus* (from a Greek word signifying *unpollutable*, as *A.* is from a Greek word signifying *indestructible*), because cloth made of it was cleansed by passing it through fire. This cloth was used by the ancients to enwrap dead bodies placed on the funeral pile, so as to preserve the ashes of the body unmixed. Asbestos is found in Savoy, the Tyrol, Corsica, Canada and the United States. A very fine quality of asbestos was discovered in Canada in 1874. The inventions of H. W. Johns, of New York, have greatly extended the uses of this mineral. It is now employed for fire-bricks and crucibles, for boiler coverings, for the radiating surfaces of heating apparatus, as an absorbent in lamps, as an insulator, and for a great many other purposes in connection with manufactures, such as making paints, roofing material, cement, coatings and sheathing.

The asbestos paint forms an almost fireproof coat which protects wood against sparks and light flames. Made into a lining felt, asbestos serves as a good insulator for heat, and has great value for packing pistons, hot-air joints, etc. Exposure to a very high degree of temperature effects no change in sheets of asbestos, which merely glow with a white heat. The kind produced in Canada is almost pure white and very fibrous. It can be spun into fine thread and woven into rope or yarn. These uses of asbestos are comparatively recent, for while it was known that the ancients employed it for its durable qualities when exposed to intense heat, it was not used for practical purposes during many centuries. The mining of it is now a regular and important industry, and in the year 1895, 1,010 tons were mined in the United States.

ASBJÖRNSEN, PETER CHRISTEN, 1812-85; b. Christiania, Norway. While supporting himself as a family tutor, he studied medicine and zoology, and devoted much time to the collection of peasant folk tales and traditions. His first work, *Norwegian Folklore*, 1842, was written in conjunction with Jørgen Moe, and was followed by several similar collections of popular stories, a complete edition of which was issued in 1879. A. has made ornithological and zoological explorations along the coast of Norway, and discovered some rare animal forms.

ASBURY, FRANCIS, b. England, 1745, d. Va., 1816; the first bishop of the Methodist Episcopal church ordained in the United States. He obtained rudimentary education in a village school; at the age of 13 was converted; at 14 was apprenticed to a trade; at 16 became a local preacher; at 22 was received by Wesley into the itinerant ministry; and at 26 landed in Philadelphia as a missionary to America. It was but three years after the building of the first Methodist church in the country, and there were only about 600 persons of the faith, chiefly in Philadelphia and New York. When the revolution began, A. sympathized with the people, and while Mr. Rankin, who was his ecclesiastical superior, returned to England, A. remained, though, like many other non-jurors, he was subjected to suspicion, and at one time to imprisonment. After about two years of surveillance the authorities concluded that the scruples of A. and other preachers were not political, but religious, and he was permitted to go free. He improved his opportunity, and when the war closed there were 83 Methodist ministers at work, and the membership reached 14,000. In 1784, the several societies were organized into an Episcopal church, and A. was chosen bishop. Thenceforward his life was devoted to preaching and the superintendence and extension of churches. His labors were incessant, and his biography is itself a good history of the growth of Methodism in America. He never married, lest a wife should distract attention from his great work. He was always poor, and always generous. In 1785, he laid the foundation for the first Methodist college, and afterwards formed an educational plan for the whole country by making districts with at least one classical academy in each. He was rather stout, of medium height, with a fresh countenance and a penetrating eye. Wesley alone was his superior as a practical worker and organizer, and the two were alike in zeal and spirit. During his ministry it is estimated that A. traveled more than 270,000 m., visiting every part of the country; preached more than 16,000 sermons, ordained over 4000 ministers, and presided at 224 conferences. It is largely due to the labors of this indefatigable apostle, that Methodism in America owes its excellent organization and wonderful growth. His only written works were his journals in 3 vols., which are personally and historically of great value.

ASBURY PARK, a city and summer resort in Monmouth co., N. J., n. of Ocean Grove, from which it is divided by Wesley lake. It is situated on the Atlantic ocean, 6 m. s. of Long Branch. It is on the Pennsylvania, Central of New Jersey, and New Jersey Southern railroads. There are 300 hotels and boarding-houses, many private dwellings, churches, public halls, several newspaper offices, a graded school, banks, electric lights and street railways. The sale of liquor is prohibited. A. was founded 1869 and chartered as a city in 1897. Permanent pop. about 5000; summer pop., 25,000 to 50,000.

AS'CALON, or **ASH'KELON**, a ruined city of Palestine, situated on the shore of the Mediterranean, 36 m. w.s.w. of Jerusalem, and 12 m. n. by w. of Gaza. It was in ancient times a fortified city, and the principal town of one of the five lordships of the Philistines. Its name often occurs in the history of the people of Israel in the Old Testament, where it is represented as falling at an early period into the hands of the tribe of Judah. Herod the great embellished it with baths, palaces, and fountains; but in the subsequent wars with the Romans, it suffered much damage. There was a celebrated temple of Derketo, the Venus of the Syrians, at A., which is recorded to have been plundered by the Scythians, 630 B.C. After continuing long under the dominion of the Roman empire, the city came into the possession of the Saracens in the 7th century. In 1099, a great battle was fought on the plains of A., between the crusaders and Saracens, when the Christians gained a decisive victory. The city, however, a number of years after, was recaptured by the Moslems, and held by them as a strongly fortified place until 1153, when it was taken by the crusaders under Baldwin III. In 1187, it was retaken by the Saracens, but afterwards (1192) fell into the hands of Richard Cœur de Lion. Subsequently, being more than once dismantled and repaired during the wars between Richard and Saladin, it was reduced to desolation by sultan Bibars in 1270.

ASCARIS, a genus of *entozoa*, or intestinal worms, of the order *nematoidea* of Zedar, Cuvier, etc., and of the division *sterelemnintha* of Owen. The ascarides have a body approaching to cylindrical, but thickest in the middle. They inhabit the intestines

of animals. The species are numerous. One of the best known is *A. lumbricoides*, often called the common round worm, which occurs in the intestines of man and of some of the lower animals, as the hog, ox, horse, etc., and which often occasions severe disease, and sometimes death, particularly when it ascends from the intestines to the stomach. Its presence even in its most ordinary situation in the small intestines, is attended with unfavorable effects upon the general health; and the greater the number present—which, however, is not usually large—the greater, of course, is the injury; although when they remain in the intestines, worms of this species are less injurious and less annoying than other and even much smaller intestinal worms. In subjects otherwise diseased, they occasionally find their way out of the intestines into the closed serous cavities of the body, and even pass through ulcerated parts of the external integument; but the mouth is formed only for suction, and is provided with no means of boring through the healthy intestine. An immense number of remedies (anthelmintics or vermifuges) have been proposed and used in order to expel this parasite, some of which are very effectual. They do not in general kill the worms, but act by making their dwelling-place disagreeable to them (see VERMIFUGE). It is, however, remarked by Küchenmeister, in his work on parasites, that the treatment of cases of this description is as yet purely empirical, because, although there must be a condition of the intestinal canal which favors the thriving of worms, we are by no means certain what it is.

The *A. lumbricoides* is ordinarily, in size and appearance, pretty much like the common earthworm (*lumbricus terrestris*), from which resemblance it has received its specific name, although the resemblance is rather in general form than in more essential characteristics. It has been seen 15 in. in length. Its mouth consists of three fleshy tubercles, which can be spread out upon the intestine to form a broad circular sucker, and within which there is a small tube capable of being protruded. The alimentary canal consists of a muscular gullet and stomach, and a thin-walled intestine. Between the muscular layers of the body is produced a pale reddish oily matter, with a strong and very peculiar odor, which is gradually communicated to spirit in which the worm is preserved. The males are smaller than the females, and much more rare. The females produce eggs in great numbers; but it is uncertain if ever they are developed within the intestine in which the parent worm resides. They are certainly capable of being developed elsewhere, and probably the young enter the intestines of the animals of which they are eventually to be the parasites, after having spent a certain stage of their existence in very different circumstances: the worm in a very young state having never been found in the intestines of man or of quadrupeds, the situation of its perfect development. The inhabitants of damp valleys are believed to suffer more than others from the *A. lumbricoides*. It is said also to be particularly frequent in persons who are much accustomed to eat raw leaves and roots; and it has been supposed that the young may exist, perhaps in an encysted state, in the bodies of insects or other very small animals which are accidentally eaten along with such food.

A. vermicularis is another species usually referred to this genus, and is the only other species troublesome to mankind. It is known as the thread-worm or maw-worm, and is very common both in children and adults. It infests chiefly the lower part of the intestines, and particularly the rectum, great numbers being often present together, and occasioning intolerable itching, irritation, and loss of sleep, although there is not in general much serious injury to health. The same anthelmintics employed against other intestinal worms are found efficacious also in the expulsion of this; and clysters are often employed with great success. The thread-worm is white, not more than half an inch in length, the male much less. Some recent authors of high reputation have separated this species from *A.*, and call it *oxyuris vermicularis*, but the term *ascarides* is often employed in medical works with exclusive reference to it; and indeed this name, derived from the Greek *askarizo*, to jump or move briskly, probably owes its origin to the liveliness of motion which this species exhibits. It has been recently discovered that its nervous system is very highly developed, consisting of many ganglia, with connecting and ramifying cords.

ASCENDANT. In astrology, the easternmost star in a horoscope is the A., or "house of life." It was deemed to have the most influence on destiny, or to give the strongest indication of the future; so it is said when one's prospects improve, "his star is in the ascendant."

ASCENSION. one of the comparatively few single islands on the globe, being about 685 m. to the n.w. of St. Helena, and almost as far to the s.s.w. of St. Matthew. It is said to have received its name from the circumstance of its having been discovered by a Spanish navigator on Ascension day. It is nearly in the middle of the south Atlantic, the lat. of its fort being 7° 55' 55" s., and its long. 14° 25' 5" w. A. is 8 m. long by 6 broad; its area being about 35 sq. m. Though it was discovered as early as 1501, yet it remained uninhabited till 1815, when, in connection with Napoleon Bonaparte's detention in St. Helena, the English took possession of it. It is now used as a naval victualing station and hospital. The population, according to a report made in 1890, number 240, chiefly officers and sailors. Like St. Helena, it is of volcanic origin, and generally mountainous—one peak rising to a height of 2870 ft. From the extreme dryness of the climate, which, however, is healthy, the surface is nearly destitute of verdure.

Among indigenous productions are the tomato, castor-oil plant, and pepper; European vegetables are cultivated. See Mrs. Gill's *Six Months in A.* (1879).

ASCENSION, RIGHT (Lat. *ascensio*, a rising; Ger. *gerade aufsteigung*), the name given in astronomy to one of the arcs which determine the position relatively to the equator of a heavenly body on the celestial sphere, the other being the declination. See **ARMILLARY SPHERE**. It is the arc of the equator intercepted between the first point of Aries (q. v.) and the point at which the circle of declination passing through the star cuts the equator. Measured always from w. to e., right A. on the heavens corresponds to longitude on the earth. The right A. of a heavenly body is ascertained by means of the transit instrument and clock. The transit instrument determines its meridian passage, and the transit clock gives the time at which this takes place. When the first point of Aries is in the meridian, the clock stands at 0 hours, 0 minutes, 0 seconds, and it is so arranged as to indicate 24 sidereal hours, the time that elapses between two successive passages of that point. The reading of the clock, therefore, at the passage of any heavenly body gives its right A. in time, and this, when multiplied by 15, gives the same in degrees, minutes, and seconds. The right A. is usually given, however, in time. The old term, *oblique A.*, was given to the right A. of the point of the equator that rose simultaneously with the heavenly body; and the difference of the oblique and right A. was called the "ascensional difference."

ASCENSION, a parish in s.e. Louisiana, on both sides of the Mississippi, s.w. and w. of Amite river and lake Maurepas; 324 sq.m.; pop. '90, 19,545, inclu. colored. The soil is alluvial and frequently inundated, but is extremely productive in corn, cotton, rice, sugar, and molasses. Judicial seat, Donaldsonville.

ASCENSION DAY, or **HOLY THURSDAY**, one of the great religious festivals of the Episcopal and also of the Roman Catholic church. It is held on the fortieth day after Easter, and is intended to commemorate the ascension of Christ into heaven. It is one of the six days occurring in the year for which the church of England appoints special psalms, and the same church also particularly recommends it as a fitting day for the receiving of the communion. Ascension day has been observed from the earliest times of the Christian church. St. Augustine believes it to have been instituted either by the apostles themselves, or the primitive bishops succeeding them. Connected with the religious observances of this day were certain civic ones, which in some parts of England and Scotland are continued to this day—viz., *beating the bounds*, or *riding the marches*, though their religious connection is apparently forgotten. See **ROGATION DAYS** and **PERAMBULATION**.

ASCETICISM. Among the Greeks, *askēsis* denoted the exercise and discipline practiced by the athletes or wrestlers, who had to harden their bodies by exertion and to avoid all sensual and effeminating indulgences. In the schools of the philosophers, especially of the Stoics, the same word signified the practice of mastering the desires and passions, or of severe virtue. In these senses it passed into the language of the early Christians. The language of St. Paul in comparing the Christians to wrestlers who had to contend with Satan, the world, and the flesh, contributed to this. But the philosophy of the time had more to do with it, which held the freeing of mind from matter to be the means of union with God; or, at least, that the refraining from all luxurious pleasure was the way to restore the soul to its original purity. To understand the vast influence that ascetic ideas have exercised on the Christian religion, we must look beyond the bounds of its history. Their root lies in the oriental notion that the absolute or all is the only real existence; and that individual phenomena, especially matter in all its shapes, are really nothing, and are to be despised and avoided, as involving the principle of separation from the absolute. The east, accordingly, is the native soil of A. The glowing imagination of the oriental carries the practice of it to a monstrous extravagance, as is seen in the frightful self-tortures of the yogis and fakirs, the suicides in the sacred Ganges and under the wheels of Juggernaut, and the practices now or recently prevalent of offering children in sacrifice, and of burning widows; most of which, however, have been humanely suppressed by the efforts of the British government. Buddhism, which may be considered as a kind of puritan revival or reformation—the methodism of the Indian religion—carried the principle beyond its previous bounds. In its condemning the world, in its inculcating a life of solitude and beggary, mortification of the body, and abstinence from all uncleanness and from all exciting drinks, the object was to keep as distant and detached as possible from this "vale of sorrow" (see **BUDDHISM** and **NIrvANA**). The sober Chinese, and the more moral and rational Persians, never carried asceticism to these extravagances; and the earnest Egyptians sought to confine it to monogamy of the priests, abstaining from the flesh of swine and from beans, rigid purity, circumcision, moderate flagellation, and frequent contemplation of death (which there were arrangements for bringing to remembrance, even in the midst of festivities). These are certainly milder forms of A., but the principle is the same.

It is in the light of this fore-history that we must consider Judaic and Christian asceticism. In the oriental mind, especially in Egypt, circumcision, avoiding of all uncleanness, and fasting, were signs of humiliation before God; and in the Mosaic ritual they were conditions of the favor of the holy Jehovah. Voluntary vows, abstaining even

from lawful food, wine, etc., were held to have a special purifying, consecrating efficacy, particularly for prophets and men of special callings. But self-castigation continued for long foreign to the sobriety of Judaism, and even hermitism came into established practice only shortly before Christ, in Palestine among the Essenes (q.v.), in Egypt among the Therapeutæ (q.v.); though doubtless Jewish A. had become more stern and gloomy since the exile in Babylon.

A. was far less congenial to the reflective nations of the west, above all to the cheerful Greeks. A Greek felt himself entitled to enjoyment as well as his gods; hence Greek religious festivals were pervaded by cheerfulness. The only exception appears to be the Eleusinian mysteries, which never took hold of the people generally, and the passing phenomenon of the Pythagorean fraternity. The attack made by the Socratic school upon the body as the prison of the soul—a view reminding one of the east—and the extravagant contempt for the elegances and even decencies of life, professed by the later Stoics and Cynics, were no genuine fruits of the popular Greek mind; and we must also ascribe to the infusion of oriental philosophy the ascetic tendencies of Neoplatonism, in holding abstinence from flesh and from marriage as chief conditions of absorption into the divinity.

It was into the midst of these ideas that Christianity was introduced. The Jewish converts brought with them their convictions about fasting. Fasting and Nazaritic observances were thought sanctifying preparatives for great undertakings; and the inculcation of abstinence from marriage, on the ground of the expected speedy re-appearance of Christ, falls in with the same notion, namely, that the flesh, that is, the sensuous part of our nature, is the seat of sin, and must therefore, before all things, be rigorously chained. The old oriental traditions of A.; the spirituality of Christianity, pointing away from earth to heaven; opposition to the corruption of the heathen world; the distinction made between belief and knowledge, as a higher and lower stage of intelligence, leading to a corresponding distinction of a higher and lower stage of virtue: all combined to make the Christians of the first two centuries hold aloof from the world and its wisdom, and favor abstinence from marriage, more especially on the part of the clergy. This ascetic spirit began as early as the commencement of the 2d c. to court trial in the perilous practice of men and women living together under vows of continence. We find Cyprian dissuading from the dangerous experiment, and even the authority of the church interposed to the same effect. But during the first three centuries no irrevocable vows yet bound the devotees to a life-long A. Fasting was also comparatively rare.

But the tendency to outward manifestations now began to grow stronger. The inward and spiritual life of the Christians had greatly declined; and if the previous bloody persecutions had driven individuals from human society into the deserts, the growing secularization of the church, after Christianity became the state religion, had the same effect to a still greater degree. All this paved the way for the chief manifestation of A.—namely, monasticism, which the church found herself compelled by the overwhelming tide of opinion within and without to recognize, and to take it under her protection and care. See MONACHISM. From the African church, represented by Tertullian and Augustine, a spirit of gloomy and crushing supernaturalism spread deeper and deeper over the western church generally, intensifying the ascetic tendencies, and leading to still more marked separation from a despised world. There were not wanting healthier minds—as Jovianus, Vigilantius, and others—to raise their voices against fasting, monkery, and the outward works of A. generally; but such protests were vain, and became ever rarer.

From the 11th c., the Cathari, Waldenses, and other sects, though ascetics themselves in a way, yet assailed the external A. of the church; the classic Petrarch fought on the same side; and so did Wickliffe, Huss, and Jerome of Prague, in their premature struggles at reformation. After a preliminary skirmish by Erasmus, the struggle was decided in the reformation of the 16th c. The fundamental principle of that movement, that salvation is secured by justification through faith, and not through dead works, struck at the root of monkery and mortification in general. But the victory has not been so complete as is often assumed. The ascetic spirit often shows itself still alive under various disguises even in Protestantism. The Mennonites inculcated a rigid A.; and with the Shakers of America, celibacy is practiced as a virtue. The essence of A. is to hold self-denial and suffering to be meritorious in the sight of God, in and for itself, without regarding whether it promotes in any way the good of others or the improvement of the individual's own character. In this light, many traits presented by Puritanism, Methodism, and Quakerism appear ascetic. It is not impossible that vegetarianism, total abstinence, and other recent austerities, though advocated on other grounds, recommend themselves to the feelings of many from their falling in with this deep-seated propensity to A.; which seems a relic of that dread of the malignity of the invisible and supernatural powers which haunts the human mind in an unenlightened and savage state.

Even in the Roman church, ascetic practices have been modified in recent times; fastings are less rigorous, and the self-sacrifice of conventual life is more directed to beneficial ends. Mohammedanism has undergone the same change. In the Greek church, monasticism had always a ruder form.

ASCH, a t. in the w. of Bohemia, 100 m. w. n. w. from Prague. It has cotton, linen, and woolen manufactures. Pop. 15,557.

ASCHAF FENBURG, the chief t. on the right bank of the Main, in the Bavarian district of Unterfranken (lat. $50^{\circ} 1' \text{ n.}$, long. $9^{\circ} 7' \text{ e.}$). It is built upon an eminence, and has both a healthy and attractive situation; but the streets are narrow, irregular, and slope steeply towards the river. The castle of Johannisberg, built between 1605-14, by Johann Schweikhardt, elector of Mentz, and the favorite hunting residence of many of his successors, forms a quadrangle, with towers at each corner, and overlooks the whole town. Besides the collegiate church, the military barracks, and the town-hospital, A. possesses a Roman villa, built by the late king Louis, in imitation of the Castor and Polux edifice discovered at Pompeii. It is celebrated for its manufacture of colored papers, besides carrying on a considerable trade in wood, building-stone, tobacco, wine, etc. Pop. '90, 13,275, principally Catholics. A. existed as early as the invasion of Germany by the Romans, who built a castle here. In 974, Otto I., duke of Swabia and Bavaria, founded the collegiate church, which greatly increased the prosperity of the place. After Otto's death, it came into the possession of the archbishops of Mentz, and remained with them until the dissolution of the Germanic empire. In 1814, along with the principality of which it is the capital, it was ceded to Bavaria by Austria.

ASCHAM, ROGER, a distinguished English writer and classical scholar, was b. in 1515 at Kirby Wiske, in Yorkshire. He received his early education in the family of Sir Anthony Wingfield, and in 1530 entered St. John's college, Cambridge, where he took his degree of M.A. in 1536. The study of the classics, especially Greek, had recently been revived at Cambridge, and the natural bent of A. impelled him with ardor to these studies. His reputation as a classical scholar soon brought him numerous pupils; and there being at that time no Greek chair, he was appointed by the university to read lectures in the public schools. He at first opposed the then new method of pronunciation which is still used in England; but afterwards adopted and defended it. His leisure hours were devoted to music, penmanship, in which he excelled, and archery. In defense of the latter art, he wrote, in 1554, a treatise entitled *Toxophilus*, the pure English style of which, independently of its other merits, ranks it among the classical pieces of English literature. For this treatise, which was dedicated to Henry VIII., he was rewarded with an annual pension of £10, equivalent to about \$500 of our present money. About the same time, he was appointed university orator. In 1548, on the death of his former pupil, Grindal, he was called to supply his place as master of languages to the lady Elizabeth. In this office he gave the highest satisfaction; but at the end of two years abruptly resigned it, on account of some offense he had taken at some persons in the princess's household. That he did not lose favor at court, however, is manifest, from his having soon after been appointed secretary to Sir Richard Morysine, ambassador to the court of Charles V. He spent three years in Germany, and published an account of his observations in that country. He also made a short tour in Italy. During his absence, he had been appointed Latin secretary to Edward VI. On his return, after the death of the king, the interest of Gardiner, bishop of Winchester, secured his appointment to the same office under Mary; his pension also was doubled. His prudence and moderation preserved him from offending by his Protestantism. After the death of Mary, Elizabeth retained him at court in the double capacity of secretary and tutor, which he discharged till his death, in 1568. His principal work, *The Schoolmaster*, a treatise on classical education, was published in 1571 by his widow. His Latin letters and poems have been frequently reprinted. The best edition of the former is that of Elstob (Oxford, 1703). To an edition of his English works, by the Rev. J. Bennet (1767), is prefixed a life by Dr. Johnson.—**ASCHAM**, a case for the reception of the bow, arrows, strings, and other accoutrements of the archer, derives its name from the author of the *Toxophilus*.

ASCHE, RABBI, b. at Babylon, 353 A.D.; the first and principal editor of the "Talmud," on which he worked 30 years, leaving the finishing to his disciples, Abina and Jose. He was a man of great learning.

ASCHERSLE BEN, a t. in the district of Magdeburg, in the province of Prussian Saxony, lat. $51^{\circ} 46' \text{ n.}$, long. $11^{\circ} 27' \text{ e.}$ It is situated on the river Eine, is 32 m. distant from Magdeburg, and has a pop. of (1890) 22,893. The inhabitants are chiefly occupied in agriculture and gardening, but its trade is not very important. It has, however, considerable manufactures of woollens, linens, earthenware, etc. In the vicinity are some ruins erroneously supposed to be those of the old burgh of Ascania, the original seat of the house of Anhalt.

ASCIA'NO, a t. of north Italy, 12 m. s.e. from Siena, on the left bank of the Ombrone. Pop., 7541.

ASCIANS, or **ASCI**, people near the equator, who have the sun over their heads, and consequently have no visible shadow, twice a year.

ASCIDIA, a Linnæan genus of marine mollusca, now much restricted as a genus, but the type of a family called *ascidiade*. The name ascidians is also commonly employed to designate all those tunicated mollusca which form the order *saccobranchiata* of Owen, or in which respiration is carried on by means of gill-sacs (*branchial sacs*); and these are

divided into compound and solitary ascidians (*aggregata* and *solitaria*). The ascidians, along with the other *tunicata*, are acephalous, or destitute of a head, and are inclosed, not in a shell, but in an elastic tunic with two orifices, composed of a substance apparently identical with the *cellulose* of plants, consisting only of carbon and hydrogen. Within the external tunic is a muscular membrane, regarded as corresponding to the *mantle* of other mollusca, and the openings of which agree with those of the tunic. The greater part of the cavity of the mantle forms a branchial sac, the lining of which, folded in various ways, constitutes the gills (*branchiæ*); and into it currents of sea-water are continually brought by the respiratory movements, passing out through the vent or anal orifice. Multitudinous *cilia* in the mouth and branchial sac, cause by their action this continual flow of water. The motion of the cilia is apparently quite involuntary. By this flow of water, the particles of food requisite for the animal are brought in, so that the aëration of the blood and the supply of the stomach are carried on together and by the same means. The œsophagus or gullet opens from the branchial sac, which is indeed regarded as probably an expansion of the upper part of it—a dilated pharynx. Under the branchial sac is the stomach; and the alimentary canal, which is more or less tortuous, finally returns upon itself, so that the two orifices are not far separate. The liver consists of follicles produced into tubes, and communicating with the stomach by a single opening. There is a heart and a circulation of blood, with the remarkable peculiarity of alternations in its course, the circulation every now and then pausing and being reversed. The transparency of many of the ascidians permits these and other internal movements to be easily observed. The nervous system is very simple, consisting of a single ganglion, situated between the mouth and the anal orifice, and which sends out filaments to both of them, and other branches over the surface of the mantle. The mantle is capable of contracting suddenly to eject a jet of water, and along with it any body the presence of which is disagreeable. It also contracts and ejects water, if the animal is touched, and this appears to be the only means of defense which these creatures possess. There is no trace of eyes or of other organs of special sense.

The ascidians are found in all seas, and often constitute an important part of the food of fishes. Some of them are occasionally used as human food, as *cynthia microcosmus* on the shores of the Mediterranean. Many of them are very small, but some attain a size of 5 or 6 in. in diameter, and when touched, eject water to a considerable height, the largest of them to about 3 ft. They are all fixed by the base, in their mature state, to some solid substance, as a rock or seaweed; sometimes by the intervention of a stalk or peduncle. In some kinds (*social ascidians*), the peduncles of a number of individuals are connected by a tubular stem, and to some extent they have a common circulation of blood, although each has its own heart, respiratory apparatus, and digestive system; and if a ligature is drawn around the peduncle of one so as to cut it off from the common circulation, circulation takes place in it as in a solitary ascidian. In other kinds (more strictly called *compound ascidians*—which designation, however, is by some authors applied to those just described, whilst these are called *aggregate ascidians*), the tunics of many are united into a mass, and they form systems like zoophytes. The compound system sometimes bears a general resemblance to an actinia. Very frequently it forms a slimy crust upon algae, shells, etc., or projects in globular or conical masses, “more like a lump of inanimate matter than a being endowed with vitality”—“a curious and interesting internal organization, veiled by the coarsest exterior.” The individuals are sometimes connected by a gelatinous flesh, which consists of cellulose, and there is sometimes a calcareous deposition in this connecting substance as in the compound polypes. The individuals in these systems have always sprung by generation from one, and both the solitary and compound ascidians propagate by eggs. The young have the power of active locomotion, resemble tadpoles in form, and swim by means of a vibratile tail, which disappears when they settle, being usually detached by contraction at the base. The sexes are supposed to be distinct only in some of the ascidians. The ovaries are usually large, and the ova are carried away by the stream which passes through the animal. It is in the solitary ascidians that the highest organization is to be observed, and in which alone a distinction of sexes appears. In them, a muscular ring surrounds the mouth, and can be closed to exclude what is unfit to enter. Within this aperture there is also a fringe of tentacula, short and simple, or longer and minutely divided. In the compound ascidians, gemmation does not begin till the single animal has been fully developed; thereafter, bud after bud is produced, according to the plan upon which the compound system is constructed, and “the procreative force of the germ-mass finally exhausts itself in the formation of male and female organs, in which that force is again mysteriously renewed under its two forms of the spermatozoon and the germinal vesicle, by the combination of which the reproductive cycle again begins its course.”

The name ASCIDIAN ZOOPHYTES (*zoophyta ascidioida*) has been used to designate those zoophytes or polypes which form the class *polyzoa* of Thompson, *bryozoa* of Ehrenberg, and which in certain features of their organization resemble the A., although in other respects they widely differ from them. The *alcyonidium* and *alcyonella*, already noticed in the article *alcyonium*, belong to this class. See POLYPI and ZOOPHYTE.

ASCLEPIADA'CEE, or ASCLEPIA'DEÆ, a natural order of dicotyledonous or exogenous plants, mostly shrubs, often with twining stems, almost always with milky juice. The leaves are entire, and have cilia between their stalks in place of stipules. The flowers are

peculiar in their structure, although symmetrical and regular. The calyx is divided into five segments, the corolla into five lobes; there are five stamens, and the stigma has five angles. The filaments are usually united so as to form a tube, which is generally furnished with a coronet of peculiar hood-shaped appendages; the anthers are two-celled, the pollen grains cohering in wax-like masses, which fall out of the anther cells, and become attached to glands at the angles of the stigma; there are two ovaries and two styles very close together, and often very short, with one dilated stigma common to both. The fruit consists of two follicles, or, by abortion, of one only, having numerous imbricated seeds with thin albumen, the ends of the seeds terminating in long down. There are about 1000 known species, chiefly natives of warm climates. Some of them are cultivated in gardens and hot-houses, upon account of their curious or beautiful flowers, among the most familiar of which are some of the species of *asclepias* (q.v.) or swallow-wort; perhaps none of them is more highly or deservedly esteemed than *stephanotis floribunda*, the fragrance of which equals its beauty, and which, since its introduction into British hot-houses, has been sought for the bridal garlands of the highest aristocracy. No hot-house climber is better known than *hoya carnosæ*, at each flower of which a drop of honey is always found to hang. A number of species are medicinal, as Indian sarsaparilla (q.v.) (*hæmidesmus indicus*); mudar (q.v.) (*calotropis gigantea*), so highly prized in the East Indies; *sarcostemma glaucum*, the ipecacuanha of Venezuela; *tylophora asthmatica* and *secamone emetica*, the roots of which are used as emetics, and in smaller doses as cathartics, and the former of which is reckoned among the most valuable medicinal plants of India; *cynanchum acutum*, which yields a purgative called Montpellier scammony, and *vincetoxicum officinale*, which possesses similar properties. Argel (q.v.), much used for adulterating senna, belongs to this order.—The down of the seeds is sometimes employed as a substitute for silk or cotton (see ASCLEPIAS); and the stems of not a few species afford useful fibers, as those of the *asclepias syriaca* (see ASCLEPIAS), the mudar (q.v.) and other species of *calotropis*, natives of India and Persia, *hoya viridiflora*, *holostemma rheedeanum*, etc. The mudar or yercum fiber is very highly extolled by Dr. Royle (*Fibrous Plants of India*). The bark of *marsdenia tenacissima*, a small climbing-plant, yields a fiber called *jetee*, of which the Rajmahal mountaineers make bowstrings, remarkable for their great elasticity, which they are supposed in some measure to owe to the presence of caoutchouc. The fiber of *M. roylei* is used in Nepal. *Orphanthera viminea*, which grows at the base of the Himalayas, and has long leafless wand-like stems of 10 ft. in height, yields a fiber of remarkable length and tenacity, and which is supposed to be peculiarly suited for rope-making. The fibers of *leptadenia jacquemontiana* and *periploca aphyllum* are used in Sindh for making the ropes and bands used in wells, as water does not rot them.—The milky juice of most species of *A.* is acrid, but in some it is bland, and they are used for food, as is the milk itself of the kiriaghuna or cow-plant of Ceylon (*gymnema lactiferum*). A few species, as *marsdenia tinctoria*, a native of Silhet, yield indigo of excellent quality. The flowers of the genus *stapelia* have a strong smell of carrion, and flies sometimes lay their eggs upon them, as it were by mistake.—No species of *A.* is a native of Britain.—The order is generally regarded as nearly allied to apocynaceæ.

ASCLEPIADÆ, an order of men in Greece of whom the most were trained as physicians. They claimed to be descendants of the god Æsculapius. In the course of their initiation and progression the Hippocratic oath was a part of the ceremony. At the close of their studies they had a ceremony of consecration, after which they were allowed to practice the healing art.

ASCLEPIADES, a Greek physician, born at Prusa, in Bithynia, who flourished during the early part of Cicero's life. He has been confounded with several other persons of the same name, and, in consequence, our accounts concerning him are both confused and contradictory. He seems to have wandered about considerably before he finally settled at Rome, as we read of his being at Alexandria, Parium on the Propontis, and Athens. It is not known either when he was born or when he died. *A.* was opposed to the principles of Hippocrates in medicine. Pliny, who professes very little respect for him, reduces his medicinal remedies to five: abstinence from flesh, abstinence from wine under certain circumstances, friction, walking, and "gestation" or carriage exercise, by which he proposed to open the pores, and let the corpuscles which caused disease escape in perspiration, for his leading doctrine was that all disease rose from an inharmonious distribution of the small, formless corpuscles of which the body was composed. He is said to have been very popular with the Romans on account of his pleasant and simple cures. His maxim was that a physician ought to cure surely, swiftly, and agreeably—a thing which, unfortunately, is not always possible. *A.* is also alleged to have been the first who distinguished between acute and chronic diseases, but his knowledge of anatomy was apparently very slight. The fragments of his which remain have been gathered together, corrected, and published by Gumpert, under the title, *Asclepiadis Bithyni Fragmenta* (Weimar, 1798.)

ASCLEPIAS, or SWALLOW-WORT, a genus of plants, the type of the natural order *asclepiadaceæ*. The corolla is wheel-shaped and reflexed; the coronet fleshy, and each of its hooded tips has a horn. The species are generally upright—seldom climbing and twining—herbaceous plants with opposite, whorled, or alternate leaves. They are

mostly American. The flowers are disposed in simple umbels between the leaf stalks.—*A. syriaca*, Syrian or Virginian swallow-wort, sometimes called Virginian silk, appears to be a native of North America, and not of Syria, as was supposed. It is frequently cultivated in flower-gardens. It has an unbranched stem 4 to 7 ft. high; thick, ovate leaves, covered with a grayish down on the under side; and large, stalked, nodding umbels of many dull red flowers, which diffuse a strong and sweetish odor. The whole plant is full of an acrid white milk, which contains caoutchouc. The young shoots are eaten in North America like asparagus, as those of *A. stipitacea* are in Arabia. A brown well-tasted sugar is prepared in Canada from the flowers; and the silk-like down of the seeds has been used for the manufacture of textile fabrics, either alone, or along with wool or silk, but is more frequently employed for the preparation of wadding, and for stuffing mattresses and pillows. The plant appears, however, to be chiefly valuable for the fiber of its stalks, which is used for the manufacture of thread, cloth, ropes, nets, etc., in many parts of North America, and upon account of which it has been recommended for general cultivation in Europe. The fiber is said to be of very superior quality. The plant rapidly extends by its creeping roots, and readily becomes a weed, where it has been introduced.—The roots of several other North American species are used as diaphoretics and expectorants, as *A. incarnata*, *A. tuberosa*, etc. The latter is a very ornamental garden-flower, and is called butterfly weed and pleurisy root in the United States, where it is frequent on stony and sandy grounds.

ASCOLI (anciently, *Asculum Picenum*), an old city of Italy, capital of the province Ascoli-Piceno, and the seat of a bishop, lat. 42° 50' n., long. 13° 37' e. It is built on a hill, on the right bank of the Tronto, which formed the boundary between the late Roman and Neapolitan territories. Pop. '81, 11,199. From the Adriatic, it is distant 16 m. w.; from Ancona, 53 s. Its harbor (Porto d'Ascoli) has some coasting-trade, and is defended by two forts. The town is beautifully situated, commanding a fine view of the fertile valley through which the river flows, and of the rugged Apennines, which here rise to an elevation of 7212 ft.

ASCOLI, GRAZIADIO ISAIA, a celebrated philologist, was born in Goritz, in 1829. At first he was destined for mercantile life, but following his great inclination and talent, soon turned to comparative philology, and studied without instruction so ardently and so successfully, that in his 16th year he published a highly creditable work on the idioms of the Friuli language. On account of his following greater work, *Studii orientali e linguistici*, which established the indications of numerous Semitic elements in Etruscan, he was called to Milan, where he has been professor of linguistics since 1860. Here he displayed extraordinary activity, and attracted many students; indeed, almost all the present distinguished Italian philologists, as Dall'Oca, Morosi, Guissani, studied under him. Ascoli is one of the most prominent judges of sound-changes in the Indo-Germanic languages, and has made many discoveries in this department, and has firmly established his new views. In this he anticipated the investigations of recent physiologists on the conditions and methods of development of the sounds of human language, and by this means has established the connection of physiology of sound with philology. This work has been widely recognized, and has exerted great influence. The following works show his investigations: *Fonologia comparata del sanscrito, del greco e del latino* (1870), *Studii critici* (1861-77). In 1873 he founded the *Archivio glottologico italiano*. In 1889 he was made a Senator.

ASCOLI-PICENO, one of the four provinces of the Marches, in central Italy, formerly in the papal territory; 809 sq. m.; pop. '90, 214,927. In the province are branches of the Apennine mountains, and four or five small rivers. Wine, oil, honey, corn, fish, silk, and wool are produced. Chief town, Ascoli.

ASCOT HEATH, an English race-course in Berkshire, 26 m. from London, near the London and Southern railroad. The annual meeting in June is, for a large portion of the public, one of the important events of the year.

ASCUTNEY MOUNTAIN, a rocky mass, 3300 ft. above sea-level, in Windsor co., Vt. Its top presents a splendid panorama.

ASELLI, ASELLIO, or **ASELLIUS**, CASPAR, a celebrated Italian physician, was b. at Cremona, about the year 1581. He served at first as a military surgeon, but afterwards became professor of anatomy and surgery at Padua. In 1622, while at Milan, where he was in the habit of spending a great portion of his time, he discovered the lacteal vessels. Before A.'s time, anatomists had supposed that the chyle was carried from the intestines into the liver by the mesenteric veins. Happening one day to dissect a living dog, he noticed for the first time the multitude of little vessels, which suck up the nutritive portion of the food. At first, he took them for nerves, and did not pay particular attention to them; but on pricking one with the point of his scalpel, a white liquid spirted out, and the discovery flashed on him in a moment. He seems, however, never to have understood or described them with complete accuracy. He d. at the age of 45, leaving a treatise on the subject of his discovery, which was published a year after his death. It is entitled *De Lactibus, sive Lacteis Venis, Quarto Vasorum Mesaraicorum Genere, Novo Invento, Dissertatio*, and has several times been reprinted.

ASEL LUS, in ichthyology, a generic name now disused, but by which the cod and other gadidae were formerly sometimes designated. It is retained in the pharmacopœias, in the name of cod-liver oil, *oleum jecoris aselli*.—The same generic name is now employed, in a different department of natural history, to denote a genus of small isopod crustaceans.

ASEPTICISM. See ANTISEPTICS.

ÆSES. The singular of this name in old Norse, is *As*, pl. *Æsir*; in Gothic, *Ans*; in Saxon, *Os (Es)*. The *Æ* are a race of gods in northern or Scandinavian mythology (q. v.), though not the oldest, yet the most powerful, like the Jupiter dynasty among the Greeks. They are usually considered as numbering twelve gods, and as many goddesses. The gods are—Odin, Thor, Baldur, Niord, Freyr, Tyr, Bragi, Heimdal, Widar, Wali, Uller, and Forseti; the best known of the goddesses—Frigga, Freyja, Idunna, Eira, and Saga. The worship of the *Æ*., or the Odin religion, was rooted not only among the nations of Scandinavia, but among the Germanic races generally, at least in its outlines. Besides other traces, proofs of its prevalence are to be found in a multitude of Gothic, Saxon, and old high German proper names, many of which continue still in use, though their connection with German paganism passes unperceived: Oswald, Esmond, Oswin, Anselm, Ansgar, etc.

ÆSGARD (from *As*, “god,” and *gard*, “home”), the home of the Norse gods, or the Scandinavian Olympus. It was said to stand in the middle and highest part of Ida’s plain, which is the center of the universe. There the *Æsir* (gods) built a court, or hall, with seats for twelve, and one high-seat for Odin, the all-father; and also a lofty abode called Vingolf, for the goddesses. The gods worked diligently, played at games, were rich in precious things, and happy until three maidens from Jötunheim, “giant’s world,” crossed the plain and entered Asaheim, when corruption began to spread among the inmates. *Æ* had many mansions, the largest and noblest of which was Gladsheim, “home of gladness,” while another not so large, but fairer and brighter than the sun, was called Gimli. The latter mansion will stand when heaven and earth shall have been destroyed by fire, and will be the dwelling-place of brave and upright men. There is a historical explanation of this myth: that Asaheim was a country east of the Don in Asia, where there was a city of Asgard in which ruled a chief named Odin, or Woden; that Odin, fearing subjection by the Romans, led his people across Russia to Sweden and settled at Sigtuna (Upsala); that his priests or chief men founded other settlements, and established the worship of their ancestors; that in lapse of time the man Odin and his chiefs came to be looked upon as gods. No date can be settled for such a migration; but from 120 to 80 B. C. has been thought probable, for then Mithridates Eupater was defying the armies of Rome. The Norse civilization and religion were undoubtedly of Aryan origin. See *Æsir*.

ASGILL, JOHN, an eccentric English *littérateur*, born in the year 1659. He studied for the bar, and at intervals during the whole of his checkered life transacted legal business in some form or other; but having early displayed a predilection for writing political pamphlets, he soon became involved, in spite of his cleverness, in serious pecuniary difficulties. Fortunately for him, parliament had just passed an act (1699) for the resumption of forfeited estates in Ireland, and commissioners were appointed to settle claims. A bright vision flitted across the mind of the much-harassed man. He sailed for the sister isle, and found the whole country wrangling in law-suits. His talents, and the favor of the commissioners, secured to him a lucrative practice; and he even acquired sufficient influence to obtain a seat in the Irish parliament. Some time, however, before taking possession of his seat, *A.* had published a most extraordinary pamphlet, entitled *An Argument proving that, according to the Covenant of Eternal Life revealed in the Scriptures, Man may be translated hence into that Eternal Life without passing through Death, although the Humane Nature of Christ himself could not thus be translated till he had passed through Death* (1700). Much to *A.*’s surprise, the public flew into a rage against this absurd production; the Irish parliament voted it a blasphemous libel, and the astonished author was expelled from the house after four days. In 1705, *A.* returned to England, and entered the English parliament as member for Bramber, in Sussex. But the fame of his unlucky pamphlet haunted him perpetually, and at last proved a Nemesis; for the English house, resolving to be not less virtuous than the Irish one, took up the treatise, condemned it to be burnt by the common hangman, as profane and blasphemous, and expelled *A.* on the 18th Dec., 1707. After this his circumstances rapidly grew worse, until at last he found something like peace in the King’s Bench and the Fleet, between which two places his excursions were confined for the term of his natural life. Here he continued to practice professionally, and—for he never succeeded in overcoming this weakness—to indite innumerable pamphlets on political and theological topics. He d. in Nov., 1738.

• **ASH**, *Fraxinus*, a genus of trees belonging to the natural order *oleaceæ*, and distinguished by very imperfect flowers, in which the calyx is obsolete, and the corolla either wanting or 3 to 4-partite; the fruit is a *samara*, a seed-vessel foliaceous at the extremity. The leaves are deciduous, and are pinnate with a terminal leaflet. There are about fifty species, mostly natives of Europe and of North America.—The COMMON ASH (*F. excelsior*) grows wild in the middle and s. of Europe and n. of Asia. It is an undoubted native of Britain. The flowers are quite naked; the leaves have five or six pairs of leaflets. The flowers appear before the leaves in spring, and the tree is not covered with leaves until the season is far advanced, losing them again early in autumn. It is, however, a most beautiful and umbrageous tree, highly ornamental in parks; but in parks or hedgerows it is extremely injurious to the grass or crops immediately around it. It

risers to the height of 100 to 150 ft., generally with a smooth stem. The wood is white, tough, and hard, much valued by wheelwrights, cartwrights, coach-makers, joiners, and turners. It is also excellent for fuel. Sometimes it becomes irregular in the disposition of its fibres, and finely veined, and is then prized by cabinet-makers. The wood of the young trees is almost as valuable as that of the old. Indeed, the value of the timber is greatest in trees of which the growth has been rapid, as it exhibits the characteristic toughness in the highest degree. The A. prefers a loamy soil, but grows in almost any, and succeeds in situations too elevated or too exposed for most other trees. It has of late been extensively planted in elevated situations in some parts of the n. of Scotland, and there, in the more sheltered glens, it grows to a large size. Cultivation has produced and perpetuated a number of varieties, of which the most remarkable are the *weeping A.*, with boughs bent almost straight down to the ground; the *curl-leaved A.*, with dark-green wrinkled or curled leaves; and the *entire-leaved A.*, a very curious variety, with many or all of the leaves simple (not pinnated), which has been erroneously regarded by some botanists as a distinct species, and named *F. simplicifolia*, *F. heterophylla*, etc.—The SMALL-LEAVED A. (*F. parvifolia*) and the LENTISK A. (*F. lentiscifolia*) are both natives of the shores of the Mediterranean, and are very graceful and ornamental trees.—The AMERICAN A., or WHITE A. (*F. americana*), is readily distinguished from the common A. by its lighter bark and paler green leaves. The flowers have a calyx, and the leaflets are shortly stalked and entire (those of the common A. being sessile and serrated). It is abundant in New Brunswick and Canada, but becomes rare to the s. of New Jersey. The trunk often rises more than 40 ft. undivided. The wood is used for the same purposes as that of the common A.—The RED A., or BLACK A. (*F. pubescens*), is very similar, but of smaller size, and has a deep brown bark. It is most abundant in Pennsylvania, Maryland, and Virginia, especially in swampy ground.—The BLACK A., or WATER A. of the New England states, New Brunswick, etc. (*F. sambucifolia*), is a large tree with buds of a deep blue color.—The BLUE A. of Ohio, Kentucky, Tennessee, etc. (*F. quadrangulata*), is also a large tree. The branches are quadrangular, the young shoots having on the angles four membranes which extend their whole length.—The GREEN A. (*F. juglandifolia*), readily recognized by the brilliant green of its young shoots, is chiefly found in the middle states; and the CAROLINA A. (*F. caroliniana*), remarkable for the great size of its leaflets, chiefly in the southern states. Besides these, North America produces a considerable number of other species or varieties. The wood of all of them is used for somewhat similar purposes to that of the common A.—In the s. of Europe grows the MANNA A., or FLOWERING A. (*F. ornus*, called *ornus europæa* by some botanists), whose flowers have a 4-partite calyx, and four small yellowish-white petals. The tree has much resemblance to the common A. From it the substance called Manna (q.v.) is obtained by means of transverse incisions in the bark; but in very favorable situations, it flows spontaneously during the greatest heat of summer. Manna is chiefly collected in Calabria and Sicily. A nearly allied species, *F. rotundifolia*, a native of Greece and the Ionian islands, yields it also in perhaps equal quantity. The common A. is said sometimes to produce the same exudation in the same warm climates. See *illus.*, *BOTANY*, vol. II., figs. 25, 26, 31, 32.

The MOUNTAIN A. is the Rowan Tree (q.v.), and belongs to a different natural order. Its resemblance to the A. is chiefly in its leaves.

ASHANGO, a tribe occupying a plateau of western Africa, south of the Ogowé, 230 miles from the Atlantic coast. They are subdivided into various lesser tribes, among which are the Obongo, a race of yellow dwarfs, whose average height does not exceed four feet four inches. See Du Chaillu, *A Journey to Ashango-Land* (1867).

ASHANTI or **ASHANTEE**, since 1896 a British province in western Africa, on the Gold Coast, in lat. 5° to 9° n., and long. 0° to 4° w. It is mountainous, well watered, and unhealthy, especially in the lower alluvial districts. The principal rivers are the Volta, Pra, and Assinie. Pop. 1,000,000, of whom a fifth are warriors. The land is extremely fertile, producing maize, millet, rice, yams, tobacco, sugar, cocoa, the pineapple, and other fine fruits, with gums, dyewoods, and timber. The principal exports are gold-dust and palm-oil, together with slaves. The natives are remarkable for their skill in certain articles of manufacture; their cottons are beautiful, as also their earthenware and sword-blades. The capital is Coomassie (q.v.).

The beginnings of the A. kingdom are obscure, but its traditions point to an emigration some hundreds of years ago from a region n. of the Kong mountains, probably caused by the spread of the Mohammedan empire of Timbuctoo. Our first positive glimpse of it is got in the year 1700, when Coomassie was made the capital by Osai Tootoo I., who conquered Akim, Assin, Gaman, Denkira, and other neighboring states, and became a sort of feudal sovereign over a large district. In their course of conquest over the Pantees, the Ashantis became involved in war with the British (1807-26), and were finally driven from the sea-coast. In 1873-74, in consequence of disputes arising in connection with the cession of the Dutch forts to Britain, they were again involved in a war with the same power; and an army under Sir Garnet Wolseley forced its way to the center of the kingdom. After a severe battle at Amoafu, and several days' fighting, Coomassie was taken, Feb. 4, 1874, and burned on the 6th, and though the rainy season had set in, the army returned in safety to the coast. In 1895 the King of Ashanti

(Prempeh) having molested the English settlers on the coast, a strong British force was sent again to Coomassie, which it reached with little resistance. The king was forced to submit to English authority, and the kingdom became a British province (January, 1896).

ASHBORNE, or **ASHBURN**, a market t. of Derbyshire, England, a short distance from the left bank of the Dove, in a fertile valley, amid beautiful scenery, 13 m. n.w. from Derby. The streets are pretty regular, the houses mostly of brick. The parish church of A. is supposed to have been erected in the 13th century.

ASHBURTON, Lord **ALEXANDER BARING**, b. in 1774, a younger son of Sir Francis Baring, bart., was, in early life, for many years commercially engaged in the United States and the Canadas, in the service of the great London mercantile house founded by his father. On the death of the latter, in 1810, he became the head of the firm of Baring Brothers & Co., and in 1812 was elected M.P. for Taunton. He represented that place, Callington, and Thetford, on the liberal interest, till 1831, and in 1832 was returned for North Essex as a moderate conservative. In the short administration of Sir Robert Peel (1834-35), he was president of the board of trade, and master of the mint, and was created baron A. by patent in April, 1835. This title had been conferred in April, 1782, on the celebrated lawyer, John Dunning, who had married Alexander Baring's aunt, and it became extinct on the death of his cousin, the second lord A., in 1828. In 1842, lord A.'s knowledge of business, and thorough acquaintance with American institutions, customs, and modes of thought, caused him to be appointed special ambassador to the United States, to settle the north-west boundary question, and other disputes, that then threatened to involve the two countries in war. In August of the same year, he concluded the famous treaty of Washington, commonly called the A. treaty, by which the frontier line between the state of Maine and Canada was definitively agreed to. By this treaty, seven twelfths of the disputed ground, and the British settlement of Madawaska, were given to the United States, and only five twelfths of the ground to Britain; but it secured a better military frontier to England, and included heights commanding the St. Lawrence, which the award of the king of Holland, who had been chosen arbiter, had assigned to the Americans. By the 8th and 9th articles, provisions are made for putting an end to the African slave-trade; and the 10th article provides for the mutual extradition of suspected criminals. Lord A. opposed free-trade, but strongly supported the penny-postage system when first proposed by Rowland Hill in 1837. He formed a valuable collection of old paintings. His death took place May 13, 1848.—His eldest son, William Bingham Baring, second lord A. of this creation, b. in 1799, and educated at Oriel College, Oxford, entered parliament in 1836, as member for Taunton, and in Sept., 1841, was appointed secretary to the board of control. In Feb., 1845, he became paymaster-general of the forces, and treasurer of the navy. In 1855 he was made commander of the legion of honor, and in 1860 he was president of the geographical society. He d. in 1864.

ASHBURTON RIVER, a stream of western Australia, rising in the mountains west of the Great Desert, and flowing 400 miles northwestward into the Exmouth Gulf.

ASHBURTON TREATY. See UNITED STATES.

ASHBY-DE-LA-ZOUCH, a small t. near the source of the Mease, a tributary of the Trent, in the n.w. of Leicestershire. Pop. in 1891, 4535. Leather making is the principal manufacture, but nail-making, malting, wool-stapling, iron-smelting, and the manufactures of stockings, hats, and fire-bricks are carried on. In the neighborhood are collieries; and saline springs containing common salt in greater proportion than the sea; and ironstone, limestone, and fine clay are found. A canal 30 m. long, without a lock, connects the t. with Coventry. The ruins of A. castle stand on a height on the s. side of the town. Mary Queen of Scots was once confined in this castle.

ASHBY, **TURNER**, 1824-62 a confederate officer in the civil war, celebrated as a leader of cavalry. He was made a brigadier-general in 1862, and was killed in June of that year in an engagement near Harrisonburg, Va.

ASH'DOD. See AZOTUS.

ASHE, a co. in n.w. North Carolina, bordering on Tennessee and Virginia; 300 sq. m.; pop. '90, 15,628, with colored. A mountainous region, good for grazing, but not for crops. Co. seat, Jefferson.

ASHE, **JOHN**, 1720-81; an American general in the revolution; b. North Carolina, came to America, 1727. He was a representative in the North Carolina colonial assembly, and presiding officer for three years. It is said that he was the first man to suggest the provincial congress, of which he was a prominent member. He joined the army early in the war, and led a force in 1775 to take Fort Johnson. He was with Gen. Lincoln in 1779, and was defeated by Prevost at Briar Creek. In 1781 he was a prisoner of war, but on parole.

ASHE, **THOMAS SAMUEL**, 1812-87, b. in North Carolina, was for several years in the state legislature; was elected to the confederate house of representatives in 1861; to the confederate senate in 1864, and represented his district in the United States congress, 1873-77. He was a judge of the state supreme court.

ASHER, the eleventh of Jacob's sons and the third by Zilpah, Leah's handmaid, founder of one of the twelve tribes of Israel. His birth is assigned to 1914 B.C. Gad was A.'s full brother. When they left Egypt the tribe of A. was the ninth in strength, numbering 41,500; when they entered Canaan they had increased by 11,900, and become fifth in size. Their geographical position was along the sea-shore from Carmel, with Manasseh on the s., Zebulon and Issachar on the s.e., and Naphtali on the n.e. The tribe had become unimportant in the time of David, perhaps dispersed among the Sidonians, whom they could not subdue. Asher had four sons and one daughter.

ASHES, the remains of animal and vegetable bodies after burning. It is not strictly correct to speak of the ashes of a mineral. When lead is exposed to heat, it turns to dross, which has the appearance of A., but is merely the lead combined with oxygen. In the same way, volcanic A., as they are called, are only a finer kind of pumice-stone, the solidified scum of molten lava. The ashes of organic substances destroyed by fire consist of the fixed salts contained in these substances. In land-plants, the most important are salts of potash, along with silica and lime; in sea-plants, soda takes the place of potash. By lixiviation of the A., the potash or soda is dissolved and separated from the insoluble mass, and is then purified by crystallization. The A. of sea-plants contain also more or less iodine. Peat and turf ashes contain, besides alkalies, more or less clay and sand; the same is true of pit-coal, which sometimes contains iron.

At one time, the A. or inorganic ingredients of plants were considered unessential to their existence. But the progress of vegetable chemistry has taught that a certain proportion of saline food is necessary to the development of plants. The analysis of the A. of the different kinds of vegetable substances has since become of great interest.

The A. of animal bodies do not differ greatly from those of vegetables. Bone-A. consist essentially of lime united with phosphoric acid. This bone-earth is very valuable as manure for grain. In well-wooded countries, A. from burnt wood form an article of considerable trade. They are much used in the arts, as soap-boiling, bleaching, dyeing, glass-making, etc. Wood-A. are also used in washing and other domestic processes as a cheap preparation of potash (q.v.).

The covering of the head with A. has long been a common sign of mourning among eastern nations, indicative of the very deepest distress. Instances of this are mentioned in Scripture. Penitents in the early Christian church signified their sorrow and humiliation in like manner, by standing at the door of the church in "sackcloth and ashes." See **ASH-WEDNESDAY**.

ASHEVILLE, city and co. seat of Buncombe co., N. C., on the Southern railroad, one mile east of the French Broad river, and about 275 miles west of Raleigh. It is situated 2205 feet above the sea, among magnificent mountain scenery, has a ladies' college, academies, large hotels, banks, and daily, weekly, and monthly periodicals. Shoes, ice, tobacco, and flour are the chief industries. Adjoining the city is the great Vanderbilt estate, known as Biltmore. Pop. of city, 1890, 10,235.

ASHIKAGA, a line of military rulers (shoguns, or "tycoons"), or lieutenants of the mikado, who ruled Japan, 1335-1573, the last being overthrown by Ota Nobunaga.

ASHKENAZIM, the name of a northern people mentioned in the 10th chapter of Genesis, located in Armenia or its neighborhood. At the present time the German and Polish Jews are termed Ashkenazim, as opposed to the Sephardim, the Spanish and Portuguese Jews. They have separate synagogues, with a somewhat different ritual and a different pronunciation of Hebrew, but there is no doctrinal distinction, and they show no disinclination to social intercourse and intermarriage.

ASHLAND, a co. in n.e. Ohio, intersected by the Atlantic and Great Western, and the Pittsburgh, Fort Wayne and Chicago railroads; 390 sq.m.; pop. '90, 22,223. The surface is hilly, but the soil is remarkably fertile in grain and well suited to cattle-raising and dairy products. Co. seat, Ashland.

ASHLAND, a co. in n.w. Wisconsin, on lake Superior; intersected by the Wisconsin Central railroad; 2150 sq.m.; pop. '90, 20,063. Iron ore is found, and there is a ridge, 1200 ft. high, called Iron mountain. Co. seat, Ashland.

ASHLAND, village and co. seat of Ashland co., O., on the New York, Lake Erie and Western railroad; 50 m. w. of Akron and 65 s.w. of Cleveland. It has churches, several newspapers, a public library, miscellaneous manufactures and a trade in grain. It is the seat of Ashland University, non-sectarian, founded in 1878. Pop. 1880, 3000; 1890, 3566.

ASHLAND, a borough of Schuylkill co., Penn., in the coal region, 12 m. from Pottsville, on the Philadelphia and Reading, and Lehigh Valley railroads. It has churches, collieries, banking facilities, schools, a public hall, foundries, machine shops, planing-mills, etc., and is the center of the anthracite coal fields of this part of the State. Several newspapers are published here. Pop. 1890, 7346.

ASHLAND, city and co. seat of Ashland co., Wis., on Chequamegon Bay, one of the finest harbors on Lake Superior. Steamers connect it with all lake ports, and it is situated on the Wisconsin Central, Chicago, St. Paul, Minneapolis and Omaha, the Northern

Pacific and Chicago and Northwestern railroads. It is 185 m. n.e. of St. Paul, and contains churches, banks, several lumber mills, charcoal plant, steel plant, flour mills, brown stone quarries and extensive coal and merchandise docks. Ashland is the point from which the product of the large iron mines of the Gogebic range is shipped, the ore docks being of great extent. Settled in 1854 and incorporated in 1863, it became a summer resort, and since 1876 has made rapid growth. It was chartered as a city in 1887. Several daily and weekly papers are published. Pop. '90, 9956; has since increased.

ASHLAR, or **ASHLER**, building-stone squared and hewn, as distinguished from rubble, or rough stones which are used as they come from the quarry without being dressed. **A.** is laid in regular courses in building, and is of various kinds, according to the style of working that side of the stone which is to form the facing of the wall. Thus, there are *tooled A.*—the marks of the tooling being either *random* or in *grooves*; *polished A.*, in which the face of the stone is rubbed smooth; and *rustic A.*, in which only the joints are accurately hewn, the face of the stone being left projecting irregularly. Quarriers apply the term **A.** to squared stones before being hewn.

ASHLEY, a co. in s.e. Arkansas, bordering on Louisiana; 927 sq.m.; '90, 13,295, inclu. colored. Corn and cotton are the staples. Co. seat, Hamburg.

ASHMOLE, ELIAS, a celebrated antiquary, was b. at Lichfield on the 23d May, 1617. In 1633, when only 16 years of age, he commenced the study of law, and five years after, he was admitted to practice as a solicitor in chancery. During the civil wars, he embraced the side of the royalists, and was appointed captain in lord Ashley's regiment, and controller of the ordnance; but at the same time exhibited his love of study by joining Brazenose college, Oxford, where he sedulously applied himself to mathematics, natural philosophy, astronomy, and astrology. In 1646, he became acquainted with several famous astrologers; amongst others, William Lilly, whose conversation had a great charm for him; and in 1650, he published a work of Dr. Dee's, to which he subjoined a treatise of his own. Continuing with singular perseverance his researches in this dim region of superstitious philosophy, he was enabled, in the course of two or three years, to issue his *Theatrum Chymicum Britannicum*, which procured for him a high reputation, and the friendship even of men like John Selden. In 1658, appeared his *Way to Bliss*, a work on the philosopher's stone—the last he published in connection with astrology. At the restoration of king Charles various honors and emoluments were conferred upon him. In 1682, he presented to the university of Oxford a very fine collection of rarities, which belonged to persons of the name of Tradescant, now known as the Ashmolean museum. He d. 1692.

ASHMUN, JEHUDI, an American philanthropist, was b. at Champlain, in the state of New York, in 1794. He was educated with a view to the Christian ministry; but eventually became editor, in Washington, of a monthly magazine called *The Repertory*. In this periodical he advocated the views of the African Colonization society for founding a colony of liberated negroes on the west coast of Africa. In 1821, he published a life of the Rev. Samuel Bacon, who had fallen a victim to an unsuccessful attempt to realize these views in the previous year. Learning the difficulties which surrounded a second attempt at planting a settlement in Africa, A. resolved to devote himself to the good work. Receiving an appointment as one of the agents of the African Colonization society, he conducted a body of liberated negroes from Baltimore, and landed at cape Mesurado, the seat of the infant colony, in the autumn of 1822. Dr. Ayres and the other agents of the society having meanwhile abandoned the settlement from severe illness, he assumed the superintendence of affairs as the sole representative of that body. Here, for more than six years, he devoted his powers and his life to the establishing, on a fair and solid basis, this colony, so full of hope for the American negro. He showed great courage and tact in opposing the united forces of the natives at the outset of his management, and no less ability in after-negotiations with the chiefs, by which the colony acquired very considerable accessions to its territory. His health at length becoming sadly impaired, he bade adieu to the settlement, then recently called Liberia, in Mar., 1828, and landed at New Haven, Conn., in a state of great exhaustion. After a brief revival, he relapsed, and d. on the 28th Aug., 1828, in his 35th year.

ASHTABULA, a co. in n.e. Ohio, on lake Erie; intersected by the Lake Shore and Michigan Southern, and the Ashtabula, Youngstown and Pittsburg railroads; 700 sq.m.; pop. '90, 43,655. Co. seat, Jefferson.

ASHTABULA, a city in Ohio, in a county and on a river of the same name, three miles from lake Erie, and 54 miles n.e. of Cleveland, is entered by the Lake Shore and Michigan Southern and other railroads. It contains churches, a public library, graded schools, and publishes several newspapers. It has a rolling mill, shaft factories, manufactures of farm implements, rubber clothing, etc., and does a large business in the shipment of coal and transshipment of iron ore. The harbor at the river's mouth is a fine one. Pop. 1890, 8388.

ASH TAROTH. See **ASTARTE**.

ASHTON-UNDER-LINE, a t. in the s.e. of Lancashire. Pop. in '91, 40,494. It returns one member to parliament. It is a great seat of the cotton manufacture. The population is also employed in bleaching, dyeing, and calico-printing, in collieries, and in the manufacture of machines, bricks, etc. To the w. of the t. is a large moss or

shaking bog, containing fir-trees full of turpentine, and black oak, with a loamy bottom at the depth of 10 feet.

ASH-WEDNESDAY, the first day of Lent (q.v.), so called from the Roman Catholic ceremony of strewing ashes on the head as a sign of penitence. This custom, probably introduced by Gregory the great (590-604), was sanctioned by pope Celestin III. in 1191, and afterwards generally prevailed. Before mass, the ashes were consecrated on the altar, sprinkled with holy water, and signed three times with the cross, while the priest recited the words, *Memento quod cinis es, et in cinerem reverteris!* ("Remember that thou art dust, and must return to dust!") Next, they were strewed on the heads of the officiating priests, the clergy, and the assembled people. The ashes were said to be those of the palms consecrated on the preceding Palm Sunday (q.v.).—The Protestant church in Germany does not celebrate A. In the church of England, it is observed by the stricter members, but without anything of the ceremony from which it derives its name; and the *communion*—a series of denunciations against impenitent offenders—is appointed to be read in the service for this day.

ASIA, the largest division of land on the globe, generally regarded as the birthplace of the human race, and the most ancient seat of civilization. Its superficial area, including islands, has been estimated at from 16 to 20,000,000 sq.m., and its pop. at 840,000,000. This enormous mass of continent lies almost entirely in the northern division of the eastern hemisphere, while its world of islands extends across the equator on the south-east. On three sides, it is surrounded by the ocean; but on the w., is partially connected with Africa and Europe. The continental mass is more than four times as large as Europe. Some idea may be formed of its vast extent by the calculation that, though it contains more than half of the whole population of the globe, the number of its inhabitants is so small compared with its area, that Europe may be said to be three times more densely populated. The coast-line is about 33,000 m. in length; and on the s. and e., is diversified by seas, bays, and gulfs, affording advantages to navigation and commerce far superior to those of Africa, but inferior to those possessed by Europe and America. On the w. side, the Dardanelles and the sea of Marmora may be regarded as but a slight interruption of the great table-lands of Europe and A. which form the continent of the old world.

Horizontal Configuration.—A. is bounded n., by the Arctic ocean; e., by the Pacific ocean; s., by the Indian ocean; and on the w., by Europe, the Black sea, Archipelago, Mediterranean, and the Red sea. On the extreme n.e., the peninsular land of Kamchatka is separated from North America only by the narrow Behring's strait. On the s.e., a bridge of numerous islands—Sumatra, Java, Borneo, Papua, etc.—extends towards Australia. The body of the continent may be regarded as a trapezium, of which the offsets, consisting of several large peninsulas, bear some resemblance to those of Europe; though in A. everything is on a more gigantic scale. Thus, one of these offsets, the peninsula of Arabia, is four times as large as France. On the w. extends the peninsula of A. Minor, or Anatolia, divided from Europe by the strait of Constantinople, the sea of Marmora, and the Dardanelles, with the Black sea on the n., and the Levant on the south. On the s. of A., the peninsular configuration may be divided into three principal masses, corresponding to the southern coast of Europe: Arabia may be considered as a counterpart to Spain; Italy, with its neighbor-island, Sicily, is represented by Hindustan and Ceylon; and, as in Europe, the broken Grecian peninsula is connected with A. by a bridge of numerous islands extending on the s.e., so, in A., the eastern peninsula (or India beyond the Ganges), lying between the bay of Bengal and the Chinese sea, is connected with Australia on the s.e. by the vast Eastern archipelago. This world of islands is divided into the several groups of the Philippine islands, Borneo, Celebes, Molucca islands, Sumatra, and Java, Timor, and the numerous adjoining isles. The e. coast of A. is characterized by the deep indentations of the Pacific ocean in the Chinese sea, Yellow sea, and seas of Japan, Okhotsk, and Kamchatka; all fringed with numerous islands, and separated by the peninsula of Corea, the island of Saghalien, and the peninsula of Kamchatka. On the n., the Siberian coasts are also deeply indented; but rather by the embouchures of large rivers than by arms of the sea. The whole length of continental A., from the Dardanelles to the Japan islands, is 6000 m.; its breadth, from Malacca to the n.e. cape of Siberia, is 5300 m.; with its islands it extends from 10° s. lat. to 78° n., and from 26° e. long. to 190° e. or 170° w. Such an extent of surface must include all varieties of soil, climate, and production.

Vertical Configuration.—Equally grand are the features of this continent when re-regarded vertically: it has the most extensive lowlands, the most immense table-lands, the highest chains of mountains, and the most elevated summits in the world; tracts doomed to everlasting snow or scorching sterility, salubrious valleys of continual verdure, and noisome jungles of the rankest growth. The table-lands of Asia occupy two fifths of the whole continent. The eastern extremity is 2000 m. broad; the western, less than 1000. The whole mass may be regarded as consisting of two parts, separated, or, to speak more properly, perhaps, connected by the lofty, snow-covered mountain-isthmus of the Hindu Kush. These great divisions are styled respectively: 1. The eastern plateau, including the table-land of Tibet and the desert of Gobi; 2. The western plateau,



ATLANTIC OCEAN

ARCTIC

ASIA

British Miles
0 100 200 300 400 500 600 700 800 900 1000
Geographical Miles
0 100 200 300 400 500 600 700 800 900 1000

INDIAN OCEAN
EQUATOR

40 50 60 70 80 Longitude East of C



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or table-land of Iran. The former, a vast four-sided mass, considerably larger than the whole area of Europe, extends 2800 m. from the mountain chain, Hindu Kush, to the Tonquin gulf in China. On the s., the plateau is divided from the plains of Hindustan by the Himalaya mountains, which have a mean height of 18,000 ft., while several of their summits rise from 25,000 to 29,000 ft. above the level of the sea. Even the passes over this enormous range of mountains are almost as high as the summit of Mt. Blanc. Here Dhwagiri, long supposed to be the Mt. Blanc of the Himalayas, and with precisely the same signification, viz., "white mountain," rising to 26,826 ft., leaves all the peaks of the Andes far below: while Kunchinjunga reaches to 28,156 ft., and Mt. Everest, now believed to be the loftiest summit in the world, attains the height of 29,002 ft. Cultivation is found at 10,000 ft. above the sea; while flocks graze some 4000 ft. higher. In eastern Tartary and Tibet, the ground is cultivated at a height only 2000 ft. lower than the summit of Mt. Blanc. On the e., the table-land of Tibet is bounded by the Chinese mountain-ranges Yun-ling and Khing-khan, which, towards the s., are connected with wild Chinese alpine regions of which little is known; while towards the n., they extend into another mountainous region, where the eastern chain of Shangpe-shan opposes to the Pacific ocean a wall of rock 3000 ft. high. On the n., the chain of the Altai mountains, 3000 m. long, and divided into several groups, forms the boundary between the great plateau and the plain of Siberia, which is larger than the whole area of Europe.

The western plateau, or table-land of Iran, rises generally about 5000 ft. above the sea; but in some parts to 7000 ft.; descending again, however, in the central and southern parts, where it spreads out into sandy and gravelly plains, to 2000 and 1200 ft. It has been divided into three sections: the plateau of Iran proper; the Median-Armenian alpine region; and the Anatolian table-land. The *first* division, or the plateau of Iran, has a mean altitude of about 3000 ft. Salt plains, with gravel and sand, form large portions of the surface, and mountain-walls on all sides hem it in. On the northern edge ascend the Persian mountains; on the e., the steep and lofty parallel chains of the Indo-Persian boundary mountains; and on the s., the plateau, for 1000 m. along the Persian gulf and Arabian sea, is bounded by the wild terraced regions of Beloochistan and Farsistan. The *second* division, or the Median-Armenian alpine region, includes the mountainous regions of Armenia, Kurdistan, and Azerbaijan. Here the table-land is compressed to about half its general width. From this plateau, of which a part is mentioned in Scripture as "the mountains of Ararat," rises the volcanic cone commonly styled Mt. Ararat, to the height of 17,212 ft. above the sea level. Anatolia, the *third* and most westerly division of the table-land, is bounded along the shores of the Black sea by mountains rising to 6000 or 7000 ft., and partly covered with forests; on the s.w., the Taurus chain of mountains beginning in the islands of Rhodes, Ccs, etc., extends in several ramifications through a part of Asia Minor, runs in a single range along the coast of Karamania, and in the e. has an occasional height of 12,000 and 13,000 ft.

The western plateau, thus divided into three sections, is full of diversities of soil and scenery. A great part of the table-land of Iran (or Persia) is extremely barren and arid; which serves to explain the enthusiastic terms in which the Persian poets have spoken of the beautiful valleys found here and there among the mountains. The coasts of the Persian gulf are sandy wastes. Between Irak and Khorassan, a desert of clay, covered with salt and nitre, varied only by patches of verdure here and there, occupies 27,000 sq. m., and joins the wide sandy desert of Kerman. A great part of Beloochistan is an arid plain, covered with red sand.

Besides these central masses, there are several detached mountain chains and plateaus. The Ural mountains, forming the land-boundary between Europe and Asia, and separated from the Altai chain by salt lakes, marshes, and deserts, are divided into three sections: the northern, central, and southern Ural. The second of these divisions is rich in minerals—gold, platina, magnetic iron, and copper. On the isthmus between the Black sea and the Caspian, the alpine ridges of the Caucasus reach a height of from 10,000 to 11,000 ft., while individual peaks tower up to the gigantic height of 17,000 or 18,000 ft., as, in the still faintly volcanic peak of Elbruz (18,493 ft.) and Kasbeck (16,523)—both, however, on the northern or European side of the main mass of the Caucasus. The high lands of Syria rise gradually from the neighboring deserts to the height of 10,000 ft. in Libanus and Antilibanus, and slope steeply in terraces down to the narrow coast-lands of Phœnicia and Palestine. The plateau of the Deccan, in India, rises to an average height of from 1500 to 2000 ft., and is divided on the w. from the narrow coast-level of Malabar by the western Ghauts, 4700 ft.; on the e., from the broad level coast of Coromandel, by the eastern Ghauts. On the n., it is divided from the low plains of Hindustan by the Vindhya and Malwah mountain chains; and, on the s., the Ghauts unite at the sources of the Cavery, and form the Neilgherry (or Blue mountains, 8760 ft. high), the loftiest in the peninsular portion of Hindustan. These slope steeply down to a low narrow plain, then rise again to a considerable height in the Aligherry range, sink into the sea at cape Comorin, and reappear in the group of Adam's Peak in Ceylon. The Malayan mountains, or chains of the eastern peninsula, may be regarded as offsets of the Siue-shan, and extend to the extreme s. point of A., reappearing with volcanic peaks in the Sunda islands.

The six great *Lowlands* of A. are, 1st, The *Siberian* lowland in the n., which is by far the largest. It stretches from the northern declivities of the Altai and Ural mount-

ains to the shores of the Arctic sea, and is, for the most part, cold, gloomy, and barren. 2d, The *Bucharian* lowland, or the wild sterile waste between the Caspian sea and lake Aral, much of it beneath the level of the sea. It is composed to a large extent of gravelly soil. 3d, The *Syrian and Arabian* lowland, the s. of which is hot and arid, with almost no oases; but the n. is watered by the Tigris and Euphrates. 4th, The lowlands of *Hindustan*, comprising the great Indian desert, 400 m. broad, together with the vast and fertile plains of Bengal, generally called the valley of the Ganges, and ranking, perhaps, next to China as a region of fertility. 5th, The *Indo-Chinese* lowlands, comprising the long levels of the Burman empire, through which flows the Irrawaddy, and the rich regions of Cambodia and Siam. 6th, The *Chinese* lowlands, commencing in the e. at Peking, and extending as far s. as the tropic of Cancer, containing 210,000 sq. m., or an area seven times the size of Lombardy. It is watered by a copious river system and numerous canals, and may be regarded as a vast garden, exceeding in productiveness all other parts of the world.

Hydrography.—The hydrography of A. displays as striking a variety as the structure of its land. The alpine regions send down in some directions torrents of water, which form rivers almost rivaling in magnificence those of America, and which flow for hundreds of miles through plains of unsurpassed fertility. On the other hand, there are wide stretching tracts, like the deserts of Africa, destitute of water, and doomed to eternal sterility. Only one large sheet of water, lake Hamoon or Seistan (q.v.), refreshes the high table-land of Iran. The low steppe of Turan contains the Caspian sea (q.v.), the largest of all lakes, and lake Aral (q.v.). In the valley of Cashmere lies lake Ular, 40 m. in circumference, and the only considerable sheet of water in the Himalaya chain. At the northern base of this mountain-chain lake Palte is remarkable for its annular form. In Thibet and the Altai mountains, lakes are very numerous.

One of the most striking characteristics of Asian river-systems is found in its double rivers, or two streams rising in the same region, flowing in almost parallel directions, and either uniting, or nearly so, before entering the sea. Among these twin rivers may be mentioned—the Syr-Daria and Amu-Daria, flowing into lake Aral; the Euphrates and Tigris, in western A., surrounding the plain of Mesopotamia, uniting at Koon, and together flowing into the Persian gulf; the Ganges and Brahmaputra; and the Yang-tze-kiang and Hoang-ho, in China, rising near each other, then widely separated in their courses, but again approaching each other, and both falling into the Yellow sea, only 100 miles apart.

The six great river-systems of A., comprising rivers which will be found fully noticed under their respective names, are—the Mesopotamian, that of north-west India, that of north-east India and Thibet, the Indo-Chinese, the Chinese, and the Siberian. The *first* comprises the two famous streams, the Tigris and Euphrates. The *second* comprises the Indus with its tributaries. The *third* system comprises the Brahmaputra and Ganges. The *fourth* system comprises the rivers of the Indo-Chinese peninsula; the chief of which are the Irrawaddy, the Martaban or Saluen, the Me-nam, and the Me-king or Cambodia. The *fifth* system is the Chinese. It comprises four great streams, all of which flow in an eastern or north-eastern direction into the Pacific; the Hong-kiang, or Canton river; the Yang-tze-kiang (or Son of the Sea); the Hoang-ho, or Yellow river; and the Amur. The *sixth* system comprises the large rivers of Siberia, the principal of which are the Obi, the Yenisei, and the Lena. They all have their sources in the Altaian mountains; flow n. or nearly so; and for 800 or 900 m. before their embouchure, traverse a dreary, flat, monotonous waste, until their sluggish waters creep into the Frozen sea.

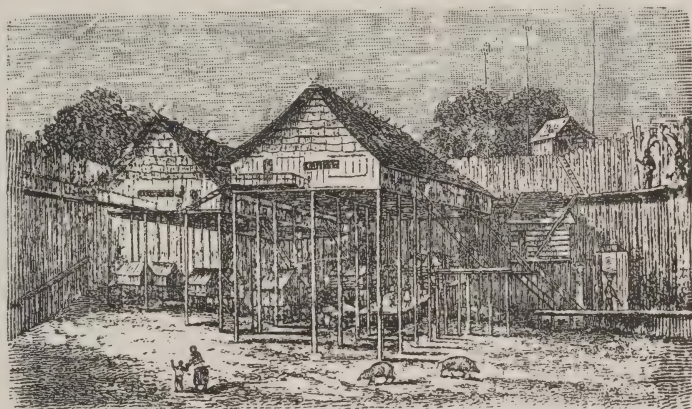
Geology.—The geographical structure of A. is so complex, the different formations are so broken up and scattered, that a general description would be unintelligible. We must refer to separate notices, where the geological structure and phenomena of circumscribed districts will be given in detail, and the reader will, in this way, be enabled to form a correct impression of the geology of Asia as a whole. See INDIA, CHINESE EMPIRE, THIBET, etc.

Natural History.—The vast extent of A., and its great diversities of climate, naturally lead us to expect in it a great variety of natural productions, both animal and vegetable. This expectation is heightened when we consider how completely this vast continent is divided into separate portions by mountain ranges of great altitude, and how extensive the mountainous tracts themselves are, as well as the great extent of the elevated plateaux or table-lands, and when we add to these considerations that of the peculiar character of wide regions—wastes of sand—level steppes—and extensive districts of which the soil is strongly impregnated with salt. Accordingly, we find, both in the flora and fauna of Asia, all the variety which such considerations might lead us to expect.

The most northerly part of the continent, however, differs comparatively little in its productions from the corresponding parts of Europe and America. It exhibits the same arctic flora, with differences comparatively inconsiderable. Pines, birches, and willows form, as in the other continents, the last forests of the n.; but upon account of the more severe climate, they do not reach a limit so northerly as in Europe, and particularly in the w. of Europe. Some of the common plants of Europe are abundant as far e. as Kamtschatka: the crowberry (*empetrum nigrum*), so plentiful in the moors of Scotland, is still more plentiful throughout Siberia; the same *vaccinia* (bilberries, etc.) and *rubi* (brambles, etc.) abound in the Kamtschatkan forests as in those of Scandinavia. There



ASIA.—1. Javanese 2. Siberian sled. 3. Arabian litter. 4. Kamtchatkans. 5. Inha
9. Dyak village. 10. Japanese priest and pilgrim. 11. Tungusians. 12. Koriak (E



ant of South China. 6. Calmucks. 7. Singalese. 8. Anamese mandarins and wives.
 (Siberia) knife. 13. Persian warrior. 14. Japanese in gala dress. 15. Buriat woman.

are, however, interesting differences. Heaths are comparatively rare in Asia, its flora agreeing in this respect with that of America, rather than with that of Europe. The larch, which in Europe occurs only on the central mountains, extends far northward at the mouth of the Obi to the utmost limits of arborescent vegetation; probably a mere variety of the same species, although it has been described as distinct. In Kamtchatka, a different kind of birch replaces the common birch of Europe as a forest tree, and the Siberian stone pine is different from that of the s. of Europe. Siberia in its less arid regions produces a luxuriant vegetation, of which herbaceous plants of unusually large size for a cold or temperate climate are a characteristic feature; as species of rhubarb, angelica, and cow-parsnip (*heracleum*), some of which are now well known in Britain. It is indeed from the central and eastern temperate parts of Asia that the cultivated species of rhubarb are derived, and from the same region the rhubarb root, so valuable in medicine, is brought. In the abundance of *grossulariaceæ* (currants), the warmer parts of Siberia resemble North America, although most of the species are different.

To the s. of the Altaian mountains, the flora of Asia corresponds in part with that of the great eastern plain of Europe; but it exhibits also peculiarities which may in some measure be ascribed to the saline character of large districts, the stony or sandy desolation of others, and the elevation of the great central plateau. The flora of Asia Minor and of Syria has a general resemblance to that of the s. of Europe, although exhibiting also features which belong rather to that of India or of Africa. Shrubby *labiate* are particularly characteristic of this region, from which not a few of them have found their way into the gardens of Europe and of other parts of the world, upon account of their fragrance, their medicinal qualities, or their use for the grateful seasoning of food. The tropical flora of Arabia abounds in trees which yield fragrant balsams and resins, particularly of the natural order *amyridaceæ*. Indeed, both the warmer temperate and the tropical regions of Asia excel other parts of the world in the number and variety of the odoriferous drugs which they produce, with odors of the most various characters, from myrrh and frankincense to asafœtida. Arabia has long been noted for the production of coffee, which is now also pretty extensively cultivated in other warm parts of A. The date-palm is as characteristic of Arabia as it is of Egypt. Acacias and mimosas also abound.—The flora of Persia in part resembles that of Arabia, although it is less tropical, and the altitude of its mountains gives to it in some places an extremely different character. The abundance of *scitamineæ* is regarded as particularly characteristic of India; and plants of this order yield ginger, galangal, cardamoms, turmeric, and other articles of commerce, amongst which not the least important is a kind of arrowroot. Its *leguminosæ* are also very numerous, both herbaceous and shrubby, or arborescent, many of them exhibiting great beauty of foliage and splendor of flowers; some producing useful kinds of pulse; others timber, gum, medicines, etc. The number of valuable medicinal plants which belong to the Indian flora is very great, as is also that of dyewoods; and it abounds in fine fruits, of which the mango and mangosteen may be particularly noticed. *Cucurbitaceæ* (gourds) are very numerous; as are also trees of the genus *ficus* (fig), some of which produce caoutchouc, and amongst which are the sacred peepul and the banian-tree, so remarkable for the roots which descend from its branches to become new stems, and for the extent of ground which it canopies. Palms are numerous in the tropical parts of A., and particularly in its south-eastern regions, but less numerous than in the tropical parts of South America. The cocoa-nut is one of the most common palms in the vicinity of the sea. Some of the Asiatic palms are valuable for the sago which they yield. The natural order *dipteraceæ* is one of those that are peculiar to India and south-eastern A., and includes some of the noblest timber-trees; but the Indian teak, so valuable for ship-building, is of the order *verbenaceæ*. The flora of the eastern peninsula, Siam, Cochinchina, and the south-eastern part of A. generally, differs considerably from that of India, and exhibits, if possible, a richer variety. The change from the Indian flora is still greater in the islands, and a resemblance to that of Polynesia and of Australia begins to appear. The bread-fruit takes the place of its congener, the jack of India. These regions produce nutmegs, cloves, and other spices. The *lawraceæ* are abundant, yielding cinnamon, cassia, and camphor. Gutta-percha has recently been added to the number of the most valuable exports. China and Japan have many plants peculiar to themselves, and are remarkable for the prevalence of the *ternstroemiaceæ*, the natural order to which the tea-plant and the camellia belong. It is scarcely necessary to mention how extensively tea is cultivated in China, and how important it is in the commerce of the world. The diversity of climate, however, both in China and Japan, is so considerable, as to imply no small diversity of productions. In like manner, the Himalaya mountains possess a flora very different from that of the Indian plains, and which in some of its most characteristic features, particularly in the prevalence of large rhododendrons and magnolias, has been found remarkably to agree with the flora of the southern parts of the United States; whilst at still greater altitudes there is a strong resemblance to that of more northern regions, or of the European Alps; forests of pines appear, and along with them the *deodar*, a cedar scarcely, if at all, different from the cedar of Lebanon. The mountains of Java also produce oaks and other trees resembling those of the temperate zone, although the species are peculiar. But many parts of A. have as yet been very imperfectly explored.

Many of the cultivated plants of Europe are known to be natives of A., and others

are supposed to be so. As the cradle of the human race, and the scene of the earliest civilization, it is natural to suppose that it supplied the first fruits and other vegetable productions which man sought to improve by cultivation; and of some which, as the apple and the cherry, are probably natives of Europe, it seems probable that the first improved varieties were introduced from A. We do not know with certainty of what part of the earth some of the principal cereal plants or grains are natives—as wheat, barley, oats, and rye; but there seems great probability in the supposition that they are of Asiatic origin. Rice certainly is. It has been cultivated from time immemorial in some of the warm parts of A.; and its introduction into other quarters of the world is comparatively recent. Maize—introduced from America—is now to be reckoned among the most important cultivated plants of A., and its cultivation is rapidly extending, as is that of the potato. Wheat, oats, barley, rye, beans, peas, and buckwheat, are the principal crops of regions similar in climate to those in which they are cultivated in Europe. Barley and buckwheat are cultivated in the Himalayas at the extraordinary elevation of almost 12,000 ft., and crops of barley are to be seen even at 15,000 ft. above the sea. Millet of different kinds, durra, and other grains of inferior importance, are cultivated to some extent in India and other warm regions; also different kinds of pulse. The banana and plantain are of the same importance as in other tropical countries; and the yam and cocco or eddoes contribute largely to the supply of human food. The sugar-cane is cultivated in the warm parts of A., but not with so much spirit or success as in America, although it is a native of the East and not of the West Indies. Pepper is one of the native productions of the East Indies, and is extensively cultivated. Tobacco, whether or not any species of it is indigenous to A., is now produced in large quantities. Indigo is extensively cultivated in India, and the opium poppy too extensively. Different species of cotton are natives of India and have long been cultivated there and in China. Hemp is cultivated in India, not for its fiber but to afford the means of intoxication; and flax chiefly for the oil of its seeds; but both hemp and flax are extensively cultivated for their fibers in other parts of A.; and India and the other tropical regions produce many plants valuable for their fibers, among which are species of *musa*, *corchorus* (yielding the jute of commerce), and *urtica* (nettle). Among the crops of India is sesamum, valued for the oil of its seeds.

It seems probable that we are indebted to the warmer temperate parts of A. not only for the orange, the lemon, and all the other species of the genus *citrus*, but also for the olive, the peach, and nectarine, the apricot, the fig, the mulberry, and the vine, with many other of the fruits now most generally esteemed and cultivated. China and Japan being the seats of an ancient civilization, many useful plants have long been cultivated there, which have scarcely yet found their way into other parts of the world. Floriculture has been practiced there with great assiduity from a remote antiquity; and varieties of hydrangea, camellia, tree peony, chrysanthemum, etc., have, from time immemorial, been scarcely, if at all, less numerous than those of the tulip and hyacinth in Holland.

The zoology of A. is not less interesting than its botany. Amongst domestic animals, the most important are the ox and buffalo, the sheep, the goat, the horse, the ass, the camel, and the elephant. A number of species of ox and buffalo are natives of A., from more than one of which the domesticated races appear to have derived their origin. Very distinct from all the others is the yak (q.v.) of Thibet, a creature which is of great use to the inhabitants of the elevated regions of the Himalayas, and is to them almost what the reindeer is to the Laplander. The sheep and goat are natives of the mountainous parts of central A. The horse and the ass seem to belong to the same regions; and all of these have been domesticated from the earliest times. The camel is of incalculable value as a beast of burden in the regions of heat and drought, and as affording the means of traversing the great deserts. It is used principally in the s.w. of A. and in India. The elephant is a native of the tropical parts of A., but is of a different species from that of Africa. The reindeer constitutes the chief wealth of some of the tribes of the n. Dogs are also used by some of the Siberian tribes for drawing their sledges. Different races of dogs are domesticated in different parts of A., and a small kind is fattened for its flesh in China; but in the Mohammedan parts of A., the dog is reckoned an unclean animal, and is known chiefly as a prowler about towns and villages, and a devourer of offal.

The tropical parts of A. abound in monkeys, of which the species are very numerous. Among them are some with long and some with short tails, but none with prehensile tails, like the sapajous of America. Many are altogether tailless, and among these is the orang-outang, found in the south-eastern islands. A much larger ape, called the pongo, has been said to exist in Borneo, but it is still a doubtful species. The same warm regions abound in bats, many of which are of large size, and feed upon fruits, not upon insects. The flying lemur or colugo is another remarkable animal of the Indian archipelago.—Bears are found in all parts of A.—the white bear in the extreme n., and other formidable species in the more temperate parts; whilst the tropical regions produce bears which are by no means ferocious, and feed chiefly on insects, fruits, and honey. Badgers are also found in A., and quadrupeds of several other plantigrade genera, allied to the bear, but of comparatively small size and inoffensive habits, as the beautiful panda (*ailurus*) of the n. of India, and the binturongs (*ictides*) of Malacca and the neighboring archipelago.—Animals of the weasel family (*mustelidae*) are numerous, among which the

teledu (*mydaus meliceps*) of Java rivals the skunks of America in the horrible stench with which it surrounds itself for defense. More important are the sable and the sea otter, pursued in the northern regions upon account of their furs.—Of the dog family, or *canidæ*, A. has not only wild dogs, but also wolves, foxes, hyenas, and jackals; the two former abounding chiefly in the colder, the two latter in the warmer regions. The arctic fox inhabits the most northerly shores and islands. The warmer parts of A. produce a number of species of the allied family of the *viverridæ*, among which are the mangouste or Indian ichneumon—famous, like the Egyptian ichneumon, for the destruction of serpents—and the civet, from which is obtained a celebrated perfume.—Of feline animals, the most dreadful are the lion and tiger; the latter of which is peculiar to A., abounding in the warm regions of the s. and e., never extending westward beyond the mountains and deserts which separate India from Persia; but, on the contrary, advancing far to the n., beyond the limits to which the lion advances, and even to the confines of Siberia. The leopard, the ounce, and many other cats, some of them large and dangerous, are found in A., especially in the warmer parts of it. Among them may be mentioned the chetah, or hunting-leopard, tamed for the chase in India.—A few small marsupial (or pouched) quadrupeds (*phalangers*) are found in the Moluccas, and form one of the links by which the natural history of A. is connected with that of Australia.—The *glires* or *rodentia*, on the contrary, are numerous in all parts of A., and many species are peculiar to it. Squirrels, marmots, rats, mice, hares, etc., are common in all except the most northerly regions. The brown rat, now so common in Europe, is said to have emigrated from Persia so recently as the beginning of the 18th century. Lemmings abound in Siberia and the Tartarian deserts, of which the jerboa is also an inhabitant. Porcupines are frequent in the warmer parts of A., and the beaver is found in the n.—Of edentate quadrupeds, the pangolins (*manis*) alone are Asiatic, and these are confined to the tropical regions.—Of *pachydermata*, there are, besides the elephant, the horse, etc., already mentioned, several species of rhinoceros, wild boars, the babyroussa, and a species of tapir; all, except the wild boar, natives of the warmest climates. One of the most interesting facts, however, connected with the natural history of A., is the abundance of remains of the mammoth, or fossil elephant, in the coldest parts of Siberia, its tusks still affording a considerable supply of ivory.—Of ruminating animals, besides those of the ox kind, already mentioned, and the sheep and goat, there are deer, antelopes, and musks or musk-deer. The reindeer and elk are natives of Siberia; further s., the species of deer are much more numerous, and the same countries produce many species of antelope. The musks are found in the central and southern parts of the continent; one of them, a native of the highest mountains, yielding the much-prized perfume from which it derives its name.—A. possesses vultures, eagles, and other *falconidæ*, owls, ravens, and other birds of the crow kind, herons, storks, cranes, etc. Swans, geese, ducks of various species, and many other *anatidæ*, frequent its waters, some of them abounding even in the coldest regions. Albatrosses are very numerous on the Kamtschatkan shores; flamingoes on those of the more southern countries. Pigeons abound, and among them is the turtle-dove. The gouras of the Indian archipelago are birds of the pigeon family, of which one species is almost as large as a turkey. There are many kinds of thrush, finch, warbler, bunting, sparrow, and other birds identical with or allied to those of Europe, among which is the nightingale, often mentioned by the Persian poets, and many also, particularly in the warmer regions, which are peculiar and characteristic. Of these may be mentioned the splendid birds of paradise of the south-eastern islands, peacocks, pheasants, etc. The gallinaceous birds of A. are numerous, and from this continent were probably derived the domestic poultry of other parts of the earth. The abundance of the parrot tribe constitutes a point of resemblance between the tropical parts of A. and other tropical countries, but lorries are peculiar to the East Indies. The ostrich inhabits the deserts of Arabia as well as of Africa. The cassowary is found in the south-eastern islands. The edible swallows' nests of the East Indian coasts have long been celebrated.—Lizards and other saurian reptiles are very abundant in the warmer parts of A.; and great crocodiles and gavials infest the rivers of the East Indies. Boas, pythons, and other great serpents are found in the tropical regions, which produce also many venomous serpents. The cobra da capello is one of the most dreaded. But the temperate parts of A. have also venomous serpents, scarcely less dangerous. Some of the East Indian tortoises are remarkable for their great magnitude, and turtles are found in the seas.—Both the salt and fresh waters of A. produce many kinds of fish. The *salmonidæ* of the rivers of Siberia supply an important part of the food of its inhabitants. The goldfish, now so well known in Britain, is a native of China. Some of the fish of the tropical parts of A. have attracted attention from the peculiarity of their form or habits. Insect life is exceedingly abundant in the warm parts of A., as in all other warm countries. Bees are numerous, and honey is produced in great quantities. Of other insects, it seems only necessary here to mention the silk-worm, which was introduced from A. into Europe; and the locust, which sometimes devastates great tracts of the Asiatic countries bordering on the Mediterranean and the Black sea, and occasionally extends its ravages into regions further w. Of molluscous animals, the pearl-oyster deserves particular notice, upon account of the important pearl-fisheries which exist in different places.

Ethnography.—The whole population, consisting of 840,000,000 people, may be divided

into the Mongolian, Aryan, and Semitic groups. The *first* of these includes all the peoples and tribes in the e., n., and s.e. of Asia; the *second* (see ARYAN RACE) embraces the inhabitants of northern India, Afghanistan, Persia, and part of Asiatic Turkey; the *third* includes the Syrian, Hebrew, and Arabian races (see ETHNOLOGY).

A further subdivision and classification may be made as follows: 1. The *East-Asian group*, including the peoples of Thibet, China, Japan, Corea, and the Indo-Chinese peninsula; all alike in the use of monosyllabic languages. This last people, however, must be subdivided into western and eastern, the former comprising the inhabitants of the Burman empire, Pegu, Laos, and Siam, having affinities with the Hindoos; and the latter, comprising the inhabitants of Tonquin, Cochinchina, and Cambodia, have affinities with the Mongolian of Thibet and China. 2. The *Tartar group*, including the Turcomans, Mongols, and Tungusians, who are spread over the whole table-land of central Asia and the neighboring lands in the n. The Turcoman family is divided into three sections—the first including the east Turcomans, inhabiting Tashkend, Khiva, Balkh, and Usbekistan; the second including the so-called Tartars of the Urals and the neighborhood of Astrakhan and Kazan; the third including the Turks or Osmanli. With the exception of a few small tribes in Siberia, all the Turkish varieties are Mohammedans, use the Arabic alphabet, and employ numerous Arabic words in their dialects. 3. The *Siberian group*, including the Samoiedes, people of Kamchatka, etc., speaking languages which have only recently been studied by philologists. 4. The *Malay-Polynesian group*, mixed with Australasian negritos, are spread over all the islands of Polynesia and the Indian archipelago. The Malayan people of Java, Sumatra, Celebes, the peninsula of Malacca, the Sunda islands, Moluccas, and Philippines, have an incipient literature, which has been formed under Moslem and (since the 16th c.) under European influence. The South sea islanders are clearly divided into two races by physical form, color, and language. One race is allied to the Australasian negrito, and the other to the Malayan. In most of the islands, there is a partial intermixture of the two races, but generally the distinction is obvious. It is probable that all the copper-colored Polynesians belong to the same family with the people of the Indian archipelago. 5. The *Deccan group*, including all the people employing the Tamul, Carnatic, Telugu, and Singalese languages, all having a certain measure of civilization and a literature. 6. The *Indo-Germanic or Aryan group*, marked and subdivided by the three languages, Sanscrit, Persian, and Armenian. About thirty distinct nations, each having a peculiar dialect and literature, belong to the first subdivision; the second includes the peoples of Beloochistan, Afghanistan, Persia, and Kurdistan; the third, the Armenians. All these families have literatures partly written in dead languages—the Sanscrit, Pali, Zend, and old Armenian. 7. The heterogeneous tribes inhabiting the Caucasus, whose affinities are not yet settled. 8. The *Semitic group*, including all the peoples whose languages are related to the Hebrew and Arabic.

Religions.—The same Asian characteristic of variety and wide contrast is found in the creeds as in the countries and tribes of people: the Brahminical religion of India; the doctrines of Buddha, Confucius, and of Lao-tse in China; the worship of the grand lama in Thibet; the creed of Islam in several varieties in Arabia, Persia, and India; the rude heathenism of the north; the various sects of native Christians in Armenia, Syria, Kurdistan, and India; the Greek church in Siberia; these and other forms of faith or religious profession display diversities and contrasts nearly as striking as those of Asian geography. Christianity, now the religion of Europe and America, owes its origin to Asia. For an account of the existing religious systems of Asia, see articles MOHAMMEDANISM, INDIA (*Religion*), BUDDHISM, LAMAISM, etc.

Civilization.—The number of people civilized—in the Asiatic sense of the word—is far greater than that of wild and nomadic hordes; but culture here, when arrived at a certain point, assumes a stationary character, widely differing from the restless intellectual activity and industrial progress of Europe. The laws of states, families, industry, commerce, art, and science are, in India and China, so many branches of one fixed and permanent religious system, which has maintained its sway through many centuries, and would long remain unchanged, if left undisturbed by European influence. The Arabs, Persians, and Turks, collectively known as the easterns, are distinct in civilization from the Hindus and Chinese. The institution of slavery among the former, of *caste* among the Hindus, and the civil and political equality of China, are distinguished marks. The Turk is a monotheist and fatalist; the Hindu is either a mystical pantheist or polytheist, acknowledging a multitude of gods; the Chinese is rather a utilitarian moralist.

Industry.—The industry and commerce of the Asiatic continent bear no adequate proportion to its capabilities—such as they are, they will be described under the different countries.

Political Aspect.—The political institutions of A. present to us some striking contrasts. While the barbarous hordes in the n. live almost without the idea of government, and scarcely know that the Russian czar claims them as his subjects, and the nomadic tribes, under their khans or sheiks, have a sort of patriarchal government, subordinate to higher powers, the most extreme forms of monarchy and despotism have existed among the more cultivated nations. The government of China is an absolute monarchy in form, but, in fact, is strictly limited by the force of tradition. The emperor is apparently unlimited in authority; but it is an essential duty of an emperor to rule exactly according to the precepts handed down by his ancestors. Reverence for ancestors and

their institutions is, therefore, the sole presiding and conservative principle which has so long preserved the great Chinese empire from political changes. A., now so passive, anciently took an active part in the great movements of the world's history; contended against Egypt and Greece, and afterwards contributed to the greatness and glory of the Macedonian and Roman empires. From the n. of the Caspian sea came the vast hordes of the Huns, who spread themselves abroad over Europe. The armies of Genghis Khan and Tamerlane overran the Slavonian plains, while the Arab caliphs, with their fanatical troops, established their religion and government in three quarters of the world. Under the Osmanli fell the eastern Roman empire, and still the Turk maintains a political position in Europe, but one now becoming very feeble and insecure. In proportion as Europe has advanced, A. has declined in political power, so as to countenance the theory of a gradual movement of the spirit of civilization and progress from the eastern to the western world. So soon as the Asiatic nations have reached a certain moderate pitch of culture, the history of civilization ceases so far as they are concerned, and is followed by the mere chronology of states or dynasties. It would appear that all great future changes in the destinies of the peoples of Asia must proceed from European impulses. When Portuguese ships had rounded the cape and so reached India, a new era of Asian history began. The Portuguese, the Spaniards, Dutch, French, Danes, and English planted their standards on Indian soil. The English speedily extended their dominion here, and soon overshadowed all the other European powers; though the Portuguese and French still maintain their footing in Hindostan, and the French, the Spaniards, and the Dutch own large territories in Further India or the Indian archipelago. Lately England has increased her influence in the extreme w. of Asia, having secured the right to occupy Cyprus, while guaranteeing the defense of the Asiatic dominions of the porte. Meanwhile Russia has extended her sway over Siberia, Caucasia, and Turkestan; securing thus the keys of China and the approaches to Persia. Even in some of the nominally independent powers, European influence is very powerful; the throne of Persia, for example, is surrounded by European diplomatists. And while Russia and Britain are striving to share between them supremacy in Asia, the French and the Americans have a large share of the commerce of the eastern coasts.

The following table gives an approximate estimate of the area and population of A., according to the more important existing political divisions:

STATE.	Area in sq. miles.	Population.
Chinese Empire :		
China Proper	1,336,841	386,000,000
Dependencies, including Manchuria, Mongolia, Tibet, Jungaria, and East Turkestan	2,881,560	16,680,000
Japan Proper	147,655	41,388,313
Formosa	13,300	3,000,000
Pescadores .....	....	37,900
Arabia	173,700	6,000,000
Persia	628,000	9,000,000
Afghanistan	278,562	4,000,000
Kafiristan	20,000	1,000,000
Baluchistan (Independent)	130,000	255,000
Siam (Independent)	200,000	5,000,000
Turkish Possessions :		
Asia Minor	204,618	9,123,432
Armenia and Khurdistan	89,264	2,457,400
Mesopotamia	100,205	1,350,280
Syria	115,144	2,676,943
Arabia	173,700	6,000,000
Total for Asiatic Turkey	682,931	21,608,055
British Dependencies :		
Aden, Perim	80	41,910
Somali Coast	75,000	....
Sokotra .....	....	10,000
Bahrein Islands		

STATE.	Area in sq. miles.	Population.
British North Borneo	31,106	175,000
Ceylon	25,365	3,008,466
Cyprus	3,580	209,286
Hong Kong.....	29	221,441
India and Dependencies :		
British Provinces	964,993	221,172,952
Native States	595,167	66,050,479
Burmah Frontiers .....	....	116,500
Sikkim	2,818	30,458
Shan States.....	....	372,969
Rajputana, etc. ....	....	204,241
British Baluchistan .....	....	145,417
Andaman and Nicobar Islands	2,186	25,000
Labuan.....	30 $\frac{1}{4}$	5,853
Straits Settlements	35,706	512,342
Russian Dependencies :		
Bokhara.....	92,000	2,500,000
Khiva	22,320	700,000
Caucasus	180,843	8,156,376
Turkestan	409,414	3,777,866
Siberia	4,833,496	4,903,281
Total Asiatic Dominions	6,564,778	19,234,687
French Dependencies :		
French India	200	279,597
Anam (dependent territory)	46,320	5,000,000
Cambodia	38,600	1,500,000
Cochin-China.....	23,082	2,034,453
Siam	110,000	....
Tonquin.....	34,740	9,000,000
Portuguese Dependencies	7,900	939,320
Spanish Dependencies	116,256	7,121,172
Dutch Dependencies	736,400	32,800,000

ASIA, CENTRAL. This term is usually, in its geographical sense, used of the region lying between the Altai mountains and the Persian gulf, and includes part of Siberia, all Turkestan, Afghanistan, Beloochistan, and part of Persia. An earlier usage—that of Humboldt—gave this name to the khanates of Bokhara and independent Tartary. In Russian official language, central Asia is an administrative division of the empire lying to the s.w. of Siberia, and comprising, with part of what used to be called Siberia, the recent Russian annexations in Turkestan. Russian central Asia is divided into the governments of Akmollinsk, Semipalatinsk, Turgai, Uralsk, Semiretchensk, Syr-Daria, Sarefchan, Kuldja, Amu-Daria, the Trans-Caspian territory, and Ferghana. The total area is given at 1,201,000 sq. m., and the pop. 4,390,000.

ASIA'GO, a t. of n. Italy, 22 m. n. from Vicenza. It stands on a ridge, among the southern spurs of the Alps. It is celebrated for the manufacture of straw-hats, and also for carpenter-work and turning. Pop. about 2000. The surrounding district, known as the "seven communes," is well wooded, and abounds in sheep and cattle. See **SETTÉ COMMUNI**.

ASIA MINOR, the ancient name of what is now called Anatolia (q.v.). Here, in Ionia, was the early seat of Grecian civilization, and here were the countries of Phrygia, Lycia, Caria, Paphlagonia, Bithynia, Lydia, Pamphylia, Isauria, Cilicia, Galatia, Cappadocia, etc., with Troy, Ephesus, Smyrna, and many other great and famous cities. Here, from the obscure era of Semiramis (about 2000 years B.C.), to the time of Osman

(about 1300 A.D.), the greatest conquerors of the world contended for supremacy; and here took place the wars of the Medes and Persians with the Scythians; of the Greeks with the Persians; of the Romans with Mithridates and the Parthians; of the Arabs, Seljuks, Mongols, and Osmons with the weak Byzantine empire. It was here that Alexander the great and the Romans successively contended for the mastery of the civilized world. But, notwithstanding all these wars, the country still continued to enjoy some measure of prosperity till it fell into the hands of the Turks, under whose military despotism its ancient civilization has been sadly brought to ruin.

ASIATIC SOCIETIES, various associations for the study of the languages, antiquities, and history of the eastern continent. The Dutch founded one in Batavia, in 1780; the royal A. society of Bengal was founded at Calcutta in 1784 by Sir Wm. Jones. One at Paris dates from 1822; one in Great Britain, 1823; the A. society of Ceylon was formed in 1845; the German oriental the same year; the A. society of China in 1847; the American oriental society in 1842.

ASINAI, an Indian tribe in Texas, called "Cenis" in La Salle's works. Missions were established among them by the Spaniards early in the 18th century. They were agriculturists, and lived in large circular cabins, of which some held a dozen or more families. As a tribe they have not been known since the 18th c., and seem to have been long extinct.

ASINALUNGA, or SINA LONGA (anc. *Ad Meusulas*), a t. of Tuscany, n. Italy, in the province of Siena, 22 m. s.e. from Siena, on the Siena railway. It is beautifully situated on hills bordering the Val di Chiana, and is a well-built t., with wide and well-paved streets, and a handsome collegiate church, in which are many fine paintings. Population about 9000.

ASKABAD, a town of Russian Turkestan, the political centre of Trans-Caspia, situated on the Trans-Caspian Railway, 290 miles southeast of Mikhailovsk, the seaward terminus. It was occupied by the Russians in 1881.

ASKEW, or **ASCOUGH**, ANNE, one of the sufferers for Protestant opinions at the dawn of the reformation in England. Having embraced the views of the reformers, she was turned out-of-doors by her husband, a gentleman of Lincolnshire, and a zealous Roman Catholic. On this she went up to London to sue for a separation; but was eventually arrested on a charge of heresy, and was examined by the bishop of London and others on the doctrine of transubstantiation, the truth of which she denied. After further examination and torture by the rack, she was burned at the stake, in Smithfield, July 16, 1546.

ASKR (Anglo-Saxon, *ask*, an "ash tree"), the name in Norse mythology of the first man created by the gods.

AS'MAI, or **ASMAYI**, ABU SAÏD ABD-EL-MELEK IBN KORAÏB EL-ASMAÏ, b. about 740 A.D.; preceptor to Haroun-al-Raschid, and an important representative of Arabic literature in the 8th century. Sir Henry Rawlinson calls A.'s history of the kings of Persia and Arabia previous to Islam, "perhaps the most valuable and authentic historic volume in the whole range of Arabian literature." His romance of *Antar* has been called "the Iliad of the desert." He d. about 830 A.D., leaving several pupils who became celebrated.

ASMANNSHAUSEN, a village in the jurisdiction of Rüdesheim, Nassau, is famed for the wine which is produced on the slate-mountains in its vicinity. Of this there are two kinds, red and white, the former of which is greatly preferred. It has a rich red color, like Burgundy, possesses a rare aromatic flavor, and is noted for its uncommon strength and fire. It is said to be the best produced on the Rhine.

ASMODE'US (properly, ASCHMEDAI, "the destroyer"), an evil genius or demon mentioned in the later Jewish writings. A. was described as the author of many evils. In the book of Tobit (q.v.), he is represented as slaying the seven husbands of Sara. and hence, in modern times, has been jocularly spoken of as the destroying demon of matrimonial happiness. In the Talmud, A. is described as the prince of demons, and is said to have driven Solomon from his kingdom.

ASMONE'ANS. See MACCABEES.

ASMONE'US, or ASSAMONEUS. See MACCABEES.

ASO'CA, *Jonesia asoca*, an Indian tree of the natural order *leguminosæ*, sub-order *cæsalpineæ*, remarkable for the beauty of its red and orange flowers. The leaves are abruptly pinnate, shining, and very beautiful. The A. is often mentioned in Indian poetry, and is connected also in various ways with the Hindoo mythology.

ASÔ'KA, ASHOKA, or DHAR-MA-SOKA, sovereign of India, son of Bindusara, b. about 300 B.C. He attempted to kill his father and was banished, but returned as his father was dying, killed all except one of his brothers, and seized the throne. Conversion to Buddhism quite changed his nature, and he built many monasteries, and left monuments that show his rule to have extended over the greater part of Hindostan.

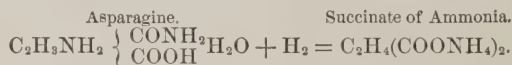
ASO'LA, a fortified v. of northern Italy, in the province of Brescia, situated on the left bank of the Chiese, 19 m. w.n.w. from Mantua. It is a place of great antiquity.

ASOPUS, god of the river Asopus, and husband of Methope, by whom he had numerous daughters, who were abducted by the gods. When Zeus carried away Ægina, Asopus rebelled, and suffered death by lightning in consequence.

ASOTIN, a co. in s. eastern Washington, on the Idaho border, formed in 1883 from part of Columbia; 640 sq. m.; pop. '90, 1580. It is watered by Snake river and other streams. has a mountainous surface, a temperate climate, and a fertile soil. Co. seat, Asotin.

ASP, *Aspis*, a venomous serpent, the name of which has come down from ancient times; the vague descriptions of ancient authors, however, causing uncertainty as to the species. It is very generally supposed to be the *naja haje*, the el haje or haje nasher of the Arabs, which is very common in Egypt, Cyprus, etc., and often appears in hieroglyphic and other sculptures as one of the sacred animals of ancient Egypt. It is sometimes from 3 to 5 ft. in length, of nearly equal thickness throughout, with a gradually tapering tail; brownish, varied with dark and pale spots; the scales of the neck, back, and upper surface of the tail slightly carinated; the tail about one fourth of the whole length of the animal. The neck is capable of considerable dilatation, through the distension of its loose skin, although not so much as that of the nearly allied cobra da capello of India (*naja tripudians*). The dilatation of the neck takes place when the serpent is irritated. The jugglers of Egypt are accustomed to perform tricks with this serpent, as those of India with the cobra da capello, causing it to dance to their music; after they have first, however, carefully extracted the poison-fangs. It is very venomous. Several varieties exist at the cape of Good Hope, one of which is nearly white; and one is called spugh slang, or spitting snake, by the colonists, from its supposed power of ejecting its poison to a distance when irritated; the poison which distills from the fangs in such circumstances being probably carried off by the forcible expirations which the creature makes—a characteristic, however, not exclusively belonging to a particular variety.—Other serpents of the same family, *viperidae*, are by some believed to be the true asp, particularly *vipera echis* and *V. cerastes*. The former is of a grayish or yellowish brown color, with rays and eye-like spots on the upper parts: it is found both in India and the n. of Africa. The latter is of a grayish color, and has a very broad heart-shaped head, a short obtuse rounded muzzle, and the superciliary or eyebrow scales remarkably developed, so that one of them is often produced into a sort of spine: it inhabits the deserts of northern Africa.—The name asp is now generally given to *vipera aspis*, a native of the Alps, found also in the s.e. of Europe and in Sicily, which much resembles the common viper, but is more slender, and has a larger head; it is also more venomous.

ASPARAGINE, $C_2H_5NH_2 \left\{ \begin{array}{l} CONH_2 \\ COOH \end{array} \right. + H_2O$, is a crystalline substance which exists ready formed in common asparagus, in the marsh-mallow, in comfrey, in potatoes, in chestnuts, in the leaves of the deadly nightshade, in licorice root, in the milky juice of the lettuce, in the tubers of the dahlia, and in the young shoots of vetches, peas, beans, etc. According to Piria, the young shoots of these plants, when formed in the light, contain as much asparagine as when they are grown in the dark, but the asparagine disappears as the plant arrives at the flowering stage. Other chemists, including Pasteur, find that vetches grown in light are free from asparagine. This substance is readily obtained from the expressed juice of the young shoots of asparagus, of young vetches, etc., which, after filtration and evaporation to a sirup, soon deposits it in crystalline prisms of a right rhombic form. These crystals dissolve freely in boiling water, the cooled solution having a mawkish and cooling taste, and a slight acid reaction. Asparagine exhibits two remarkable transformations. (1.) When its aqueous solution is heated with alkalies or acids it is decomposed into aspartic acid, $C_2H_5NH_2(COOH)_2$, and ammonia; from this and other reactions, there is no doubt that it should be regarded, according to modern views, as the amide (q.v.) of aspartic acid. (2.) While a solution of pure asparagine-crystals remains unchanged, if any *albuminous* matter is present the solution passes into fermentation, and the whole of the asparagine is converted, by the assimilation of hydrogen, from the pigment into succinate of ammonia, a reaction which may be expressed as follows:



Like most of the amides, this substance unites both with acids and alkalies, but the resulting compounds are of little general interest. That asparagine plays an important part in the physiology of plants, is obvious from its wide distribution.

ASPARAGUS, a genus of plants of the natural order *liliaceae*, having an almost bell-shaped six-partite perianth upon an articulated stalk, six stamens, one style, with three recurved stigmas, and the cells of the berry two-seeded. The species of this genus are herbaceous or shrubby plants, natives chiefly of the s. of Europe and of Africa, with abortively dioecious flowers; the stem is unarmed in some, in others thorny; at its first sprouting leafless, and covered with scales at the top; afterwards very much branched, with numerous fasciculate, generally bristle-like leaves. The most widely diffused species is the common A., *A. officinalis*, a native of Europe, which grows on the banks of rivers and on the sea-shore, in meadows and bushy places, especially in sandy soils, occurring in a few places in Britain, and is also in general cultivation as a garden vegetable; its young shoots, when they first sprout from the earth, forming a much esteemed

article of food, which, however, is only in a slight degree nutritious. These sprouts contain a peculiar crystalline substance called *asparagine*, and have a specific action on the urinary organs, so that their long continued use in very large quantities is apt even to produce bloody urine. They are no longer retained in the pharmacopœia, but both the shoots and the roots of *A.* are still occasionally used as a diuretic in dropsies, and as a lithic to dissolve urinary calculi. For these purposes the root is preferred, and is administered in the form of an infusion or decoction.—The thick and tender kinds of *A.* are most esteemed for the table. It is one of those plants which have been much increased in size and considerably altered in general appearance, by cultivation, being seldom more than a foot high in its wild state, and not much thicker than a goose-quill, whereas it has been obtained in gardens more than half an inch in diameter, and its stems rise to the height of 4 or 5 ft. It was a favorite vegetable of the ancient Romans. It is generally planted in rows, at distances varying from 1 to 2½ ft. Litter or vegetable mold is spread over it in autumn. It is allowed to occupy the same ground for many years, and the shoots are not gathered for use till the plants are four years old. Some of the growers of *A.* for the London market have 100 acres under this crop.—The seeds have been used as a substitute for coffee, and are recommended for that use upon the continent even at the present day. A kind of spirit has been made from the fermented berries. The young shoots of several other species are also eaten, as those of *A. tenuifolius*, *A. acutifolius*, and *A. albus*, natives of the s. of Europe; the last of which is much used in Spain and Portugal as a salad, in soups, and as a boiled vegetable. On the other hand, the sprouts of the bitter *A.*, *A. scaber*, which is very similar to the common *A.*, are uneatable, on account of their great bitterness. See *illus.*, FLOWERS, vol. VI.

ASPARAGUS STONE. See APATITE.

ASPAZIA, one of the most remarkable women of antiquity, was the daughter of Axiochus, and born at Miletus. The circumstance that in Athens all foreign women, whatever their character, were equally esteemed, or rather disesteemed, and that their children, even when begotten in wedlock, were held illegitimate, has originated the erroneous notion that *A.* was a courtesan. She certainly broke through the restraint which confined Athenian matrons to the seclusion of their own homes; for after her union with Pericles, who had parted from his first wife by her own consent, her house became the rendezvous of all the learned and distinguished people in Athens. Socrates often visited her. Her eloquence and knowledge of politics were extraordinarily great. Her husband—though, strictly speaking, the Athenian law would have refused this appellation to Pericles—was honored with the title of Olympian Jove, while she herself was dignified with the name of Juno. From the comic writers and others she received much injustice. It was Hermippus, the comic poet, who took advantage of a temporary irritation of the Athenians against Pericles, to accuse *A.* of impiety; but the eloquence of the great statesman disarmed the enmity of the judges, and procured her acquittal. Her influence over Pericles must have been singularly great, although this has obviously been exaggerated, and even caricatured. The brilliant but not historically accurate Aristophanes charges her with the origin both of the Samian and Peloponnesian war, the latter on account of the robbery of a favorite maid who belonged to her. Plutarch vindicates her against such accusations; and Thucydides, who details minutely the causes of the Peloponnesian war, does not once mention her name in connection with these. After the death of Pericles, *A.* married Lysicles, a cattle-dealer (an important, lucrative, and dignified profession in ancient times), who, through her influence, soon became an eminent man in Athens.

ASPÉ, a t. of Valencia, Spain, in the province of Alicante, and 21 m. w. from Alicante, near the river Elcha. It is pretty well built, but the streets are narrow and winding. It has flour-mills and oil-mills, also soap-manufactories and brandy distilleries. There is a considerable trade in wine. Pop. about 8000.

ASPECTS, in astronomy, are certain positions of planets with respect to one another, as seen from the earth. In the days of astrology, there were five aspects—conjunction (indicated by the symbol \odot), sextile (\ast), quartile (\square), trine (\triangle), opposition (\oslash). Two planets are in conjunction when they have the same longitude; the aspect is sextile when they are 60° apart; quartile, when the distance is 90°; trine, when it is 120°; and at 180° they are opposite to one another, or in opposition. Astrology ascribed to these *A.* great influence over the fate of individuals and of nations. The only two of the terms now in use are *conjunction* and *opposition*.

ASPEN, or TREMULOUS POPLAR (*pop'ulus trem'ula*, see POPLAR), a tree which grows plentifully in Europe and in Siberia. It is a native of Britain, and is frequent in Scotland, where it is found even at an elevation of 1500 ft. above the sea. It has received the specific name *tremula*, from the readiness with which its leaves are thrown into a tremulous motion by the slightest breath of wind—a property for which, indeed, the aspen-leaf has become proverbial. The leaves are nearly orbicular, but broadly toothed, so as almost to exhibit angles. The footstalks are compressed, which favors the readiness of motion. It grows quickly, with a straight stem, reaching to a height of from 60 to 80 or even 100 ft. In unfavorable situations, it becomes dwarfish. The wood is soft, porous,

light, white, and smooth; it does not make good fuel, but is very fit for the turning-lathe, and especially for being made into troughs, trays, pails, etc. It is deemed excellent for arrows. If the stem be peeled and allowed to dry before it be cut down, the wood becomes harder, and it is then capable of being used as timber for the interior of houses, and on this account the tree is of great importance in many districts, and the more so as it succeeds in any soil, although it prefers one which is moist and gravelly. The bark contains a great quantity of a bitter alkaloid, *salicin*. The charcoal made from this tree can be used in the manufacture of gunpowder.—*Populus trepida*, a very similar species, a native of North America, is called the American A. It is regarded by some as a mere variety. Very similar, also, is another North American species, *P. grandidentata*. See *illus.*, *HAZEL*, ETC., vol. VII.

ASPEN, city and co. seat of Pitkin co., Col., on the Roaring Fork of Grand river, and the Atchison, Topeka and Santa Fé and Denver and Rio Grande railroads; 30 miles west of Leadville. It was a mere mining camp in 1880, but was incorporated in 1883. It has silver mines, smelting and concentrating works, foundries, banking facilities, churches, a high school, daily and weekly newspapers. Pop. '90, 5108.

ASPENDUS, a city of Asia Minor, on an isolated hill near the river Eurymedon, at the extremity of the plain of Perga. It was founded by a colony from Argos 500 years before Christ, and reached high prosperity, as the ruins attest.

ASPERGIL LUM, a remarkable genus of lamellibranchiate conchiferous mollusca, in which the shell has the form of an elongated cone, terminating at the larger end in a disk, which is pierced with numerous small tubular holes, the little tubes of the outer range being largest, and forming a sort of ray around it. The animals of this genus are borers, some of them living in sand, others burrowing in stone, wood, or thick shells. *A. javanum* is popularly called the watering-pot, and the same resemblance has suggested the name A. (from the Latin *aspergo*, to sprinkle). The most interesting circumstance in the structure of the shelly tube of A. is the presence of two small valves, incorporated in the substance of the tube, to which they bear a very small proportion. "They there form the stamp," says Owen, "of its true affinities, but subserve as little any ordinary final purpose as the teeth buried in the gums of the fetal whale." The affinities are with mollusca inhabiting bivalve shells. A rudimentary bivalve shell is found, in like manner, cemented into the shelly tube of the fossil *teredina*, which bored the drift-wood of the London clay.

There is also a genus **ASPERGILLUS** in botany, containing many of the small fungi commonly known by the name of mould (q.v.), which occur on decaying substances of various kinds. Some of the species are peculiar to diseased animal tissues.

AS'PERN, or GROSS AS'PERN, a village of Austria, on the left bank of the Danube, 5 m. e.n.e. of Vienna. Pop. about 700. This village and the neighboring one of Essling are celebrated as the scene of a sanguinary battle in the summer of 1809, between the French army under Napoleon I. and the Austrians under archduke Charles. After the battle of Eckmühl, in which the Austrians were defeated, the archduke retired to the left bank of the Danube, leaving the road to Vienna open to the French. On the 12th of May, 1809, the French army entered Vienna, when the archduke concentrated his forces on the opposite bank of the river. Napoleon threw bridges over the river, and on the 21st the French army began crossing to the attack. The Austrians at first seemed to give way; but when about half the French had crossed the river, they returned to the charge, and almost surrounded the enemy in the narrow plain between the two villages. Here ensued the battle of A., a terrific conflict, the grand object of the contending hosts being the possession of the villages. At the close of the day, it remained undecided; but next morning it was renewed with fury on either side, when, after terrible slaughter, Napoleon ordered a retreat, and his shattered ranks retired to the little island of Lobau, in the middle of the river, whence they afterwards slowly withdrew to the right bank. The loss on the side of the Austrians was given at 4000 killed and 16,000 wounded; that of the French at double that amount. Marshal Lannes, the most daring among the French generals, was among the slain. Both the villages were reduced to heaps of ruins.

ASPERULA. See **WOODRUFF**.

ASPHALT, or **ASPHALTUM**, is the name given to a bituminous substance of a solid consistence. See **BITUMEN**. It probably owes its origin to vegetable matter which has been subjected to a slow process of decomposition or decay, resulting in the production of a bituminous coal, from which, by volcanic agency, the A. has been distilled and diffused over the neighboring district. The largest natural deposit of A. is in the island of Trinidad, where the plain known as the *Pitch lake* is found. See **TRINIDAD**. The A. from Trinidad is largely used for ships' bottoms, and is reputed to kill the teredo or borer, which proves itself so very destructive to the wood of ships in tropical regions. A. is also found on the shores of the Dead sea in large quantity, and is known to the Arabs by the name of *hajar mousa*, or *Moses's stone*. It likewise occurs in South America at Coxitambo near Cuenca, in Alsace, and other parts of the European continent, in east Lothian and Fifeshire (Scotland), in Shropshire, etc.

During the manufacture of coal-gas, much tarry matter is evolved from the retort, and is received in the coolers or condensers. If this tar be subjected to partial distillation, naphtha and other volatile matters escape, and an artificial A. is left behind, which possesses the principal properties and can be employed for the majority of purposes to

which native A. is applied. The various kinds of A. have a pitchy odor, are of a black or dark-brown color, but do not soil the fingers; are insoluble in water, sparingly soluble in alcohol; but are in great part dissolved by ether, oil of turpentine, and naphtha. *Petroleum* (q.v.), or *rock oil*, is a native liquid bitumen, which largely exudes from crevices in rocks in many districts, and is essentially A. dissolved in naphtha. The specific gravity of A. is very near that of water, ranging from 1000 to 1100. When set fire to, it burns readily with a smoky flame, and is often used in the smaller gas-works as fuel, by being allowed to run very slowly into the furnace-fires. A., besides being employed for coating the exterior of ships' bottoms, is also used, in a heated condition, for saturating timber which is intended for piles in the construction of breakwaters, river-bridges, and other situations where the combined action of the air, water, and minute animals would soon render ordinary wood rotten and useless. Wooden houses may be preserved in the same manner by a coating of A. applied externally; and ground-flooring placed in damp situations is much the better for the spaces between the planks being filled up with A.

About 1840, A. began to be generally used for foot-pavements in cities, and also for floors of cellars and out-houses. For purposes of this nature it is heated in portable boilers, into which, at a certain stage of the preparation, there is poured a quantity of thoroughly dried sand, gravel, or powdered limestone, which is well mixed with the liquid A. The mixture is then spread on the spot prepared for it; and when cool, forms a hard kind of pavement. Of this method of forming footways, high expectations were at first formed; but latterly the process of asphaltting has gone out of use in England, as it is found not to be so durable as stone, and therefore, in ordinary circumstances, more costly. In Paris, however, asphaltting is still extensively practised in the more spacious thoroughfares. The better kinds of A. are used in the manufacture of the black varnish, which is employed in forming the enamel which coats the variety of leather known as *patent leather*. A. is not of itself used in medicine, but its natural solution in naphtha, viz., *petroleum*, is a valuable agent when applied either externally or internally. The synonyms of A. are—*native pitch*, *mineral pitch*, *Jews' pitch*, *Dead sea bitumen*, *compact bitumen*, *Trinidad bitumen*, and *maltha*.

ASPHALTIC COAL, a coal-like substance in the cavities of the older rocks, having evidently fallen into the fissures while in a liquid or very plastic state. It is considered to be a species of very old asphalt that has lost most of its oil and become compact from age. It is found in carboniferous rocks, in New Brunswick and West Virginia; and in Ohio and Kentucky, in the devonian.

ASPHODEL, *Asphodelus*, a genus of plants which has by many botanists been made the type of a natural order *asphodeleæ*, now, however, generally regarded as forming part of the order *liliaceæ*. The *asphodeleæ* are either fibrous-rooted or bulbous-rooted. Among the latter are onions, hyacinths, squills, star of Bethlehem, etc.; among the former, asparagus, A., etc. The roots of the asphodels are fleshy and thick. The species are not very numerous, and are mostly natives of the countries around the Mediterranean sea. The yellow A. (*A. luteus*) and the white A. (*A. albus*) have long been known in Britain as garden-flowers. The yellow A. has an unbranched stem 2 to 3 ft. high, much covered by the sheathing bases of the long narrow leaves. The leaves of the white A. are all radical, and its flowers are in branched clusters. Both species flower about the time when spring passes into summer.

ASPHYXIA (Gr.) means literally a cessation of the pulsation from any cause, but is usually applied to the condition resulting from the blood in the body no longer being brought into the proper relations to the atmospheric air by respiration, so as to allow a sufficiently free exchange of carbonic acid for oxygen. See **RESPIRATION**. A., or suspended respiration, may result from several causes. No air, or but a scanty supply, may be admitted, as in strangulation, drowning, choking, or disease in the windpipe; the chest may be prevented from expanding either from a superincumbent weight or paralysis, as when a man breaks the upper part of his neck above the phrenic nerve, thus paralyzing the diaphragm; and again, although there may be every capacity for respiration, the air itself may be in fault, and contain too little oxygen in proportion to other elements, as carbonic acid or sulphuretted hydrogen, which act as poisons when inhaled. Aquatic animals may be asphyxiated either by depriving the water they inhabit of oxygen, or impregnating it with the gases just mentioned.

As this condition of A. advances, in drowning or otherwise, the small vessels of the lungs become gorged with blood, which the heart has no longer power to force freely through them, the right side of the heart and pulmonary artery become filled with blood, while but little returns to the arterial or left side of the heart.

The person becomes pallid, except in such vascular parts as the lips, cheeks, and finger-tips, which become blue; and soon the blood, no longer aerated, produces the phenomena of poisoning by carbonic acid. After some slight convulsive movements, the person becomes insensible, the pulsations of the heart grow gradually feebler, and at last cease altogether. In man this occurs in from a minute and a half to five minutes. Some persons, no doubt, as the Ceylon divers, can by habit do without a fresh supply of air for a longer period; and some diving animals have an arrangement of blood-vessels by which they are enabled to be under water for a long time. Restoration of asphyxiated persons may be attempted with hopes of success at a very long period after

apparent death. The object of all methods is of course to fill the lungs with fresh air. One of the most efficient is that of the late Marshall Hall: lay the person down at once with his head on his left arm, open the mouth, and draw the tongue forwards, then roll him gently over towards the left till he is nearly quite over on his face, then on to his back again, making the body by its own weight compress the chest, which, on expansion by its elasticity, fills with air. Repeat this about 15 times in a minute. This remedy nearly superseded all others for the restoration of still-born infants and other asphyxiated persons, before the introduction of the method of Dr. Sylvester, an account of which is given under **RESPIRATION, ARTIFICIAL**.

ASPHYXIANTS. Chemical substances inclosed in shells or other projectiles, and which act by producing a suffocating and poisonous effect. The French secretly made experiments with asphyxiating shot at Brest in 1851. The principle of these missiles seems to have been to carry into an enemy's ship the means of generating deadly gases which would suffocate the crews between decks. Scientific artillerymen dread and discountenance these novelties; they have learned to regard war almost as a mathematical science, or, at any rate, as an elaborate application of such science; and they see nothing but savage cruelty in the "diabolical chemistry" of asphyxiants. General Sir Howard Douglas, in a late edition of his *Naval Gunnery*, says: "The author learns, with great regret, that some awful experiments have been made with fearful success, in the royal arsenal, with asphyxiant projectiles, combining in a frightful degree incendiary with suffocating effects." Adverting to sick and wounded men on board a ship-of-war, he exclaimed: "What shall be said of that inhuman system preparing for naval warfare in this age of enlightened humanity, which would advisedly, purposely, and deliberately consign the whole of these, and all other survivors, to indiscriminate death or mutilation? A ship may be sunk in action; yet there is always time to remove the sick and wounded, and save the survivors; but who shall approach a ship on fire to rescue her crew from the sudden and awful effects of that merciless and barbarous system, the object of which is to set fire to her at heart, and, if possible, blow her up?" The earl of Dundonald, captain Norton, Mr. Macintosh, and many other inventors, some years ago brought asphyxiating compositions before the notice of the English admiralty and war-office; and the French arsenals were known to possess many such in store. Some of these compositions are liquids which burn fiercely, and lignite wood and canvas readily; some are contained in shells which, on bursting, scatter the suffocating and burning substances all around; and some assume other forms.

ASPIC, a savory meat jelly moulded into a regular form, and containing portions of fowl, game, fish, and the like, usually with hard-boiled eggs and sliced pickles.

ASPIDIUM. See **FERN, MALE**.

ASPINWALL, a t. in Colombia, virtually, however, a colony of the United States. It is situated at the Atlantic extremity of the Panama railway, in lat. 9° 22' n., and long. 79° 55' w., being about 8 m. to the n. of the old Spanish port of Chagres, 49 m. from Panama, and equidistant from the great trading capitals of Valparaiso and San Francisco. From its commanding position as a place of transit, A. is one of the busiest and most prosperous towns in the new world. It monopolizes the benefits of the traffic in both directions, to the almost utter exclusion of the rapidly decaying Panama. The climate of A., formerly very unhealthy, has been greatly improved by drainage. A. derives its name from Mr. Aspinwall, the originator of the Panama railway; it is also called *Colon*. The town was burned by insurgents, 1885.

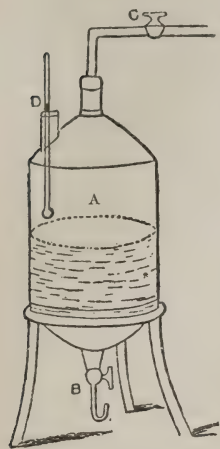
ASPIRATE, the name given to the letter *h* in grammar, as marking, not an articulate sound, but a *breathing* (Lat. *spiro*, I breathe). It is also applied to a class of consonants. There is felt at once to be a relation, accompanied by a difference, between *p* and *f*, *t* and *th*, etc. To express the difference, the Greeks called the first of such a pair *psilon* (bare), the second *dasu* (rough); the Latin grammarians adopted the terms *lene* and *aspirate*, probably from the erroneous notion that the difference consists in the addition of the sound of *h*. There being no sound and no character in Latin corresponding to the Greek *θ* (*theta*), the Romans represented it by *th*; and this misleading expedient is continued for representing this aspirate and several others in all the alphabets derived from the Roman. According to some the word ought to be *asperate*, i.e., "roughened." Of the sixteen mutes in a complete system (see **LETTERS**), eight are *lene*, each having its corresponding aspirate.

<i>Lene</i> —	<i>p, b, t,</i>	<i>d,</i>	<i>k, g, s, z.</i>
<i>Aspirate</i> —	<i>f, v, th(in),</i>	<i>th(ine),</i>	<i>ch, gh, sh, zh.</i>

In the corresponding words of allied languages, nothing is more common than the interchange of an aspirate and a *lene*: Ex., Lat. *pater*, Eng. *father*; Gr. *thura*, Ger. *thür*, Eng. *door*; Lat. *cap(ut)*, Fr. *chef*, Eng. *chief*; Ger. *weib*, Eng. *wife*. Aspirated letters are also frequently interchangeable with one another: thus, Gr. *ther*, a wild beast, is in Lat. *fera*; Lat. *facere*, to do, becomes in Span. *hacer*.

ASPIRATOR is the name of an apparatus employed to draw air or other gases through bottles or other vessels. It is of great use in the examination of gases by the analytical

chemist. The simplest form of the apparatus is that represented in the figure, where A is a large vessel capable of being filled with water, having a tube with stop-cock at B, a second tube with stop-cock at C, and a thermometer introduced at D. In work-



Aspirator.

ing, the apparatus is filled with water; the tube C is attached to the vessels through which the gas is to be drawn; and the stop-cocks at C and B being opened, the weight of the water escaping at B acts as suction, and draws in the gas from the tube C and the attached bottles or other vessels. The thermometer at D denotes the temperature of the water, and subsequently gas, contained in the reservoir, while the upright turn of the tube B keeps any air from entering the reservoir by that route. —A more complicated form of A., but one which is much more convenient to experiment with, is that known as Brunner's A.; the principle of action, however, is the same.

ASPIS, or **CLUPEA**, an ancient fortified t. of Carthage, about 50 m. e. of that city, on the sea, and having an accessible harbor. Manlius and Regulus landed here in the first Punic war; in the third war the town sustained a siege, and it is noticed in the records of the Julian civil war. It was an important episcopal see from 411 to 646 A.D., and the last place where the African Christians made resistance to Moslemism.

ASPLENIUM, a genus of ferns, of the order or sub-order *polypodiaceæ*. The species are numerous, and widely diffused both in the northern and southern hemispheres. Many of them are of great beauty; and the small size of some recommends them to cultivators of ferns who find themselves much limited as to space. Some of the species bear the English name *spleenwort*, as *A. trichomanes*, *A. viride*, *A. adiantum-nigrum*, etc., having been formerly supposed efficacious in removing obstructions of the viscera. From the same circumstance the name A. (Gr. *a*, privative, and *splen*, the spleen) is derived. They have now fallen completely into disuse, but were at one time very much employed, principally in the form of a syrup. They were administered not only in cases of cough, asthma, diseases of the liver, and cutaneous diseases, but even in stone and gravel. But perhaps none of them was so extensively used as the species which is styled in old books common spleenwort (*A. ceterach*), now the type of a distinct genus, and known as *ceterach officinarum*. Some of them, as *A. trichomanes* and *A. adiantum-nigrum*, are frequently called maidenhair. See illus., **FERNS**, vol. V.

ASPRONONTE, a mt. near Reggio, in s.w. Italy, near which, Aug. 28, 1862, occurred the fight between Garibaldi's volunteers and the Italian troops under Pallavicini. Garibaldi was defeated and captured.

ASPROPOTAMO. See **ACHELOUS**.

ASQUITH, HERBERT HENRY, was born in York, England, Sept., 1852. He was educated at the College of London School and Balliol College, Oxford; studied law and was admitted to the bar at Lincoln's Inn in 1876; elected to Parliament in 1886; appointed Queen's Counsel in 1890, and Home Secretary in 1892.

ASS, *Equus asinus*, a well-known quadruped, usually referred by naturalists to the same genus with the horse (q.v.), but which it has recently been attempted to make the type of a distinct genus (*asinus*), including all the solid-hoofed quadrupeds (*solidungula* or *equidae*, see **HORSE**) except the horse itself. The distinction is founded on the short hair of the upper part of the tail and the tuft at the end of it, the darker stripes with which the color is marked, and the absence of the hard horny warts which are found on the hinder-legs of the horse, although the forelegs exhibit warts in a similar position. The long ears of the A. are one of the characteristics of the species, but they are longer in domestication than in a wild state. It is usually also distinguished by a black cross over the shoulders, formed by a longitudinal and a transverse streak, the general color being gray; but when the general color is darker or lighter than usual, the cross is often less apparent, or to be observed with difficulty. The facial line is arched.

Some uncertainty still exists as to the origin of the domestic A.; a number of wild races having been described, some of which are perhaps, like the wild horses of America, the progeny of animals that have escaped from domestication. The probability, however, appears to be that the A. is a native of central Asia, where it is found in a perfectly wild state, in Tartary, Mesopotamia, Persia, etc., on the banks of the Indus, and even to the southern extremity of Hindustan; but its range does not extend so far northward as that of the wild horse—a circumstance which may perhaps partly account for the inferiority of the domestic A. in northern climates. The wild A. is found both in mountainous districts and in plains; vast troops roam over the great Asiatic deserts, migrating, according to the season, in summer, as far northward as the Ural; in winter, southward to the borders of India. It is fond of bitter and saline herbage, and of brackish water. It was first accurately described by Pallas, under the name *koulan*, which it bears on the high steppes around the Caspian sea. It was, however, well known to the ancients, and is

called *onager* and *asinus sylvestris* by Pliny, who also mentions, under the name *hemionus*, another species (*equus hemionus*), a native of the same regions, now called the *kiang*, or the *dziggethai*. The latter name appears to be of Turkish origin, and to signify mountain A., but seems to be sometimes applied to the one of these species and sometimes to the other. This seems also to be the case with some of their other eastern names, as *khur* or *goor*, and is a source of no little confusion.—The cross on the shoulders is less observable in the *koulán* than it usually is in the domesticated A. It ought also to be mentioned that, in one remarkable particular, the domesticated A. agrees with the *equus hemionus*, and differs from the *koulán*, the infra-orbital foramen of the skull being situated much lower. But the *kiang* neighs like a horse, and the other *brays*. The harshness of the voice of the A. is ascribed to two small peculiar cavities situated at the bottom of the larynx.

The allusions to the wild A. in the Old Testament, and particularly in Job xxxix., naturally excite the surprise of readers acquainted only with the dull domestic drudge, the emblem of patience and stolidity; but to this day they are beautifully appropriate to the wild A. of "the wilderness," which has the "barren land" or "salt places" for its dwelling, and "the range of the mountains" for its pasture.—The wild A. has a short mane of dark woolly hair, and a stripe of dark bushy hair runs along the ridge of the back from the mane to the tail. It has longer legs, and carries its head higher than the domestic A. Its troops have always a leader. It is a high-spirited animal, very fleet and very wary, trying to the utmost the powers of the hunter. It is a principal object of the chase in Persia, where its flesh is prized as venison is in Europe, and it is accounted the noblest of game. Xenophon, in his *Anabasis*, describes the wild A. as swifter of foot than the horse, and its flesh as like that of the red deer, but more tender.

The domestic A. is also, in Arabia, Persia, Syria, and other eastern countries, a much finer animal than as it is usually seen in Europe, although in Spain the favorable influence of a more genial climate upon its development is visible, perhaps also of better treatment, the A. being more highly valued. The A. is much used for riding in the East. From Judges v. 10, we learn that, at a very early period, the great were accustomed to ride upon white asses, and a preference is given to white asses in the east to this day. The A. has been domesticated from the earliest times; but it does not seem to have been introduced into Europe till a comparatively recent date. In Britain, it is employed chiefly by the poor, but might probably with advantage be much more generally employed than it is. Its price is scarcely one twentieth of the price of the horse, and it can be kept at one fourth of the expense, delighting in the coarse herbage which other animals reject, and satisfied with comparatively scanty fare. The obstinacy ascribed to the A. seems to be very generally the result of ill treatment; and proverbial as it has become for stupidity, it is probably quite equal in intelligence to the horse.

There are two hybrids between the A. and the horse—the Mule (q. v.), bred between the male A. and the mare; and the Hinny (q. v.), the offspring of the horse and the female A.

The milk of the A. contains more sugar of milk and less caseine than that of the cow, and is therefore recommended as a nutritious diet in cases of weak digestion. Its usefulness in cases of consumption has been long known, and it was often prescribed as a kind of specific when that disease was treated on principles very different from those which regulate its treatment now.

The leather called shagreen (q. v.) is made by a peculiar process from the skin of the A., which also affords excellent leather for shoes, and the best material for drums. The bones of the A., which are very solid, were used by the ancients for making flutes. See *ILLUS.*, MAMMALIA, vol. IX.

ASSAB', or **SABA**, a bay of the Red sea, west coast, near Bab-el-Mandeb. It is about 16 m. long by 5 m. wide; it is bordered on the w. by high land; in its front are two coral islands, one of which, with cape Luna, forms a harbor for small craft. In 1869 an Italian steamship company bought the whole bay for a coaling station between the Suez canal and India. Since 1884 the Italian government has improved the harbor and built a lighthouse.

ASSAI, a beverage very much used at Pará and other places on the Amazon, and which is prepared from the fruit of certain species of palm nearly allied to the cabbage palm of the West Indies. See **ARECA** and **CABBAGE PALM**. The A. palms are remarkably slender trees; the most common species (*euterpe oleracea* of Martius) rising to the height of 60 or 80 ft., with a smooth stem only about 4 in. in diameter. The fruit is small, in size and color resembling sloes, but is produced in great quantity upon branched *spadices*, which are thrown out horizontally beneath the crown of leaves. It consists of a hard seed, with a very thin covering of a firm pulp or flesh. The tree grows in swamps flooded by the high tides. Boys climb the trees for the fruit, upon which warm water is poured, and by rubbing and kneading, a liquid is procured, consisting simply of the pulp of the fruit and water, which is constantly vended in the streets of Pará, and of which the inhabitants are extremely fond. This is A. It is a thick, creamy liquid, of a purplish color, and a flavor like that of a freshly gathered nut. It is commonly used along with the bread made from manioc (q. v.), called *farinha*, and either with or without sugar. Half the population of Pará make a daily meal of A. and *farinha*; and upon this hundreds are said chiefly to subsist.—The stem of the A. palm is sometimes used for poles and rafters, and its terminal bud as a cabbage or as a salad with oil and

vinegar; but it is too much valued upon account of its fruit to be often cut down for these purposes. — Another species, *euterpe Catinga*, is found in forests of a dry sandy soil and very peculiar vegetation, known as catinga forests. The beverage made from it is sweeter than the common kind, but the produce of the tree is much smaller.

ASSAL', an important salt-lake in the e. of Africa, 25 m. s.w. of Tajurrah, the chief seaport of Adel, lat. $11^{\circ} 40'$ n., long. $42^{\circ} 40'$ e. Its length is 8 m.; its breadth, 4. It lies in a land remarkable for its wild, waste, and sterile character. A. is inclosed on all sides but the e. by hills, and is nearly 760 ft. below the level of the sea. Abyssinian caravans resort to it for the purpose of carrying off the salt which incrusts its shores, like ice, sometimes to the depth of half a foot. It has been supposed that it was at one time connected with the bay of Tajurrah.

ASSAM', a province at the n.e. extremity of British India, stretching in n. lat. from 22° to 28° , and in e. long. from 90° to 98° , and containing in '91, 5,476,833 inhabitants on an area of 49,004 sq. miles. In 1874 it was formed into a separate administration (including Cachar) under a chief-commissioner. It forms a part of the basin of the lower Brahmaputra, and is intersected also by about 60 other rivers. Being thus irrigated, as it were, by nature, A. abounds in wood, and is very fertile. Among its indigenous productions is the tea-plant. In the year 1893, 1,322,131 acres were devoted to rice. The other products are tea, oil seeds, sugar cane, other food grains, gold, ivory, amber, musk, silver, iron, lead, petroleum, and coal. From Bengal the principal imports are woollens, India fabrics, salt, opium, glass, earthenware, tobacco, betel, etc.

In 1826, at the close of the first Burmese war, A. was ceded to the British. The upper portion of the province, however, was conferred, as a separate principality, on the native rajah, whom the Burmese had expelled; and it was only in 1838, that in consequence of his misgovernment, the entire country was actually placed under British administration. Since then, the province has exhibited a noticeable improvement, for which, considering that the population is only about 60 to the square mile, there is still, however, almost unlimited scope. The great evil is the prevalence of earthquakes, few months passing without a shock or two.

ASSAROT TI, OTTAVIO GIOVANNI BATTISTA, 1753–1829, founder of schools for deaf mutes in Italy. He studied for the priesthood and became lecturer on theology to the society of the Pietists. Hearing of the Abbé Sicard's experiments with mutes, he began with a single pupil in 1801, and had slowly gathered a small number, when, in 1805, Napoleon heard of his work and provided a schoolhouse and revenue to support 12 pupils. He kept the school with success until his death.

ASSASSINATION, the act of taking the life of any one by surprise or treacherous violence, either by a hired emissary, by one devoted to the deed, or by one who has taken the task upon himself. Generally the term is applied to the murder of a public personage by one who aims solely at the death of his victim. In ancient times assassination was not unknown and was often even applauded, as in the scriptural instances of Ehud and Jael, and in the murder of Hipparchus by Harmodius and Aristogeiton (q.v.); but assassination by enthusiasts and men devoted to an idea first becomes really prominent in the religious struggles of the 16th and 17th centuries. To this class belong the plots against the life of Queen Elizabeth, while the horrible succession of assassinations of Roman emperors is simply a series of murders prompted by self-interest or revenge. Omitting these last, which are noted elsewhere, the following list includes the most important assassinations, arranged in chronological order. In general fuller accounts of the persons mentioned will be found under their particular headings:

Julius Cæsar	Mar. 15,	B.C.	44
Thomas Becket	Dec. 29,	A.D.	1170
Albert I., Emperor of Germany	May 1,	"	1308
James I. of Scotland	Feb. 21,	"	1437
Alessandro de Medici	Jan. 5,	"	1537
Cardinal Beaton	May 29,	"	1466
David Riccio	Mar. 9,	"	1566
Lord Darnley	Feb. 10,	"	1567
James, Earl of Murray, Regent	Jan. 23,	"	1570
William of Orange	July 10,	"	1584
Henry III. of France, by Jacques Clement	Aug. 1,	"	1589
Henry IV. of France, by Ravalliac	May 14,	"	1610
Villiers, Duke of Buckingham, by Felton	Aug. 23,	"	1628
Wallenstein	Feb. 25,	"	1634
Archbishop Sharp	May 3,	"	1679
Gustavus III. of Sweden	Mar. 16; died Mar. 29,	"	1792
Marat, by Charlotte Corday	July 13,	"	1793
General Kleber, at Cairo	June 14,	"	1800
Paul, Czar of Russia	Mar. 24,	"	1801
Spencer Perceval, premier, by Bellingham	May 11,	"	1812
Kotzebue, the dramatist	Mar. 23,	"	1819
Duc de Berri	Feb. 13,	"	1820
Charles III., Duke of Parma	Mar. 26; died Mar. 27,	"	1854

Abraham Lincoln, by Booth.....	April 14 ; died April 15,	A. D. 1865
Michael, Prince of Servia.....	June 10,	" 1868
Marshal Prim.....	Dec. 28 ; died Dec. 30,	" 1870
Georges Darboy, Archbishop of Paris, by communists.....	May 24,	" 1871
Earl of Mayo, governor-general of India.....	Feb. 8,	" 1872
Sultan Abdul-Aziz.....	June 4,	" 1876
Alexander II., Czar of Russia.....	Mar. 13,	" 1881
James Abram Garfield, at Washington, by Guiteau.....	July 2 ; died Sept. 19,	" 1881
Lord Frederic Cavendish and T. H. Burke, Phoenix Park, Dublin.....	May 6,	" 1882
President Carnot of France, at Lyons.....	June 25,	" 1894
Stefan Stambuloff, in Sofia, Bulgaria.....	July 15,	" 1895

In the foregoing list no mention is made of plots or attacks ending in failure. Several of those who fell had previously escaped more than once. The *Assassination Plot* in English history was a conspiracy by some Jacobites to murder William III. in 1696. It is doubtful whether Louis XIV. and James II. were privy to the scheme. The chief conspirator was Sir George Barclay. The king was to have been assassinated at Turnham Green on his return from a hunting-party, but one of the forty conspirators sent word to the king, the hunting-party was postponed, a number of the conspirators were arrested and nine were executed. A catalogue of unsuccessful attempts at assassination would be too long for insertion here, but the most important within the last hundred years have been directed as follows: Against Alexander III. of Russia, repeatedly; Alfonso XII. of Spain, in 1878 and 1879; Amadeus of Spain, 1872; Duc d'Aumale, 1841; Prince Bismarck, 1866 and 1874; Francis Joseph of Austria, 1853; George III. of England, 1786 and 1800; George IV., when regent, 1817; Humbert I. of Italy, 1878; Isabella II. of Spain, 1847, 1852, 1856; Louis Philippe, six attempts from 1835 to 1846; Lord Lytton, Viceroy of India, 1878; Napoleon I., by infernal machine, 1800; Napoleon III., twice in 1855, and Orsin's attempt in 1858; Queen Victoria, June 10, 1840, May 30, 1842, July 3, 1842, May 19, 1849, and March 2, 1882; William I. of Germany, 1861, 1875, and twice in 1878.

ASSASSINS, a military order, a branch of the secret sect of the Ismailis (q.v.). The secret doctrines of these Ismaelites, who had their headquarters in Cairo, declared the descendants of *Ismael*, the last of the seven so-called imams, to be alone entitled to the califate; and gave an allegorical interpretation to the precepts of Islam, which led, as their adversaries asserted, to considering all positive religions equally right, and all actions morally indifferent. The atrocious career of the A. was but a natural sequence of such teaching. The founder of these last, Hassan-ben-Sabbah-el-Homairi, of Persian descent, and imbued with the free-thinking tendencies of his country, had, about the middle of the 11th c., studied at Nishpur, under the celebrated Mowasek, and had subsequently obtained from Ismaelite *dais*, or religious leaders, a partial insight into their secret doctrines, and a partial consecration to the rank of dai. But on betaking himself to the central lodge at Cairo, he quarreled with the heads of the sect, and was doomed to banishment. He succeeded, however, in making his escape from the ship, and reaching the Syrian coast, after which he returned to Persia, everywhere collecting adherents, with the view of founding, upon the Ismaelite model, a secret order of his own, a species of organized society which should be a terror to his most powerful neighbors. In 1090, Hassan conquered the fortress of Alamut, in the Persian district of Rudbar; and continued to increase in strength, intimidating princes and governors by a series of secret murders, and gaining possession of several fortified castles, with their surrounding territories, both in the mountain range south of the Caspian, in Kuhistan, and in the mountains of Syria (Massiat). The internal constitution of the order, which had some resemblance to the orders of Christian knighthood, was as follows: First, as supreme and absolute ruler, came the Sheikh-al-jebal, the prince or old man of the mountain. His vicegerents in Jebal, Kuhistan, and Syria were the three *Dai-al-kebir*, or grand priors of the order. Next came the Dais and Refiks, which last were not, however, initiated, like the former, into every stage of the secret doctrines, and had no authority as teachers. To the uninitiated belonged first of all the Fedavies or Fedais—i.e., the devoted: a band of resolute youths, the ever ready and blindly obedient executioners of the old man of the mountain. Before he assigned to them their bloody tasks, he used to have them thrown into a state of ecstasy, by the intoxicating influence of the *hashish* (the hemp-plant), which circumstance led to the order being called Hashishim, or hemp-eaters. The word was changed by Europeans into Assassins, and transplanted into the languages of the west with the signification of murderers. The Lasiks, or novices, formed the sixth division of the order, and the laborers and mechanics the seventh. Upon these, the most rigid observance of the Koran was enjoined; while the initiated, on the contrary, looked upon all positive religion as null. The catechism of the order, placed by Hassan in the hands of his dais, consisted of seven parts, of which the second treated, among other things, of the art of worming themselves into the confidence of men. It is easy to conceive the terror which so unscrupulous a sect must have inspired. Several princes secretly paid tribute to the old man of the mountain. Hassan, who died at the age of 70 (1124 A.D.), appointed as his successor, Kia-Busurg-Omid, one of his grand-priors. Kia-Busurg-Omid was succeeded in 1138 by his son Mohammed, who knew how to maintain his power against

Nureddin and Jussuf-Salaheddin. In 1163, Hassan II. was rash enough to extend the secret privilege of the initiated—exemption, namely, from the positive precepts of religion—to the people generally, and to abolish Islam in the Assassin state, which led to his falling a victim to his brother-in-law's dagger. Under the rule of his son, Mohammed II., who acted in his father's spirit, the Syrian Dai-al-kebir, Sinan, became independent, and entered into negotiations with the Christian king of Jerusalem for coming over, on certain conditions, to the Christian faith; but the templars killed his envoys, and rejected his overtures, that they might not lose the yearly tribute which they drew from him. Mohammed was poisoned by his son, Hassan III. who reinstated Islamism, and thence obtained the surname of the New Moslem. Hassan was succeeded by Mohammed III. a boy of nine years old, who, by his effeminate rule, led to the overthrow of the order, and was eventually murdered by the command of his son, Rohn-eddin, the seventh and last old man of the mountain. In 1256, the Mongolian prince, Hulagu, burst with his hordes upon the hill-forts of Persia held by the Assassins, which amounted to about a hundred, capturing and destroying them. The Syrian branch was also put down about the end of the 13th c., but remnants of the sect still lingered for some time longer in Kuhlstan. In 1352, the A. reappeared in Syria, and indeed they are still reported to exist as a heretical sect both there and in Persia. The Persian Ismaelites have an imaum, or superintendent, in the district of Kum, and still inhabit the neighborhood of Alamoot under the name of Hosseinis. The Syrian Ismaelites live in the district of Massiat or Massvad. Their castle was taken from them in 1809 by the Nossaries, but afterwards restored. See Hammer, *Geschichte der Assassinen* (Stutt. and Tüb. 1818); Guyard, *Fragments* (1874).

ASSAULT. In the sudden and vigorous attack on a fortified post, which is called an A., the troops are told-off into "storming-parties," "supports," and "firing-parties." The storming-parties are those who take the most terrible duty, being that of making a forcible entry into the place. The firing-parties or musketeers seek to shield the storming-parties as much as possible from the fire of the enemy; they spread themselves out in extended order to keep down the fire of the garrison—aiming at any soldier who may show his head above the parapet, and seeking to disable the artillerymen by firing into the embrasures.

ASSAULT AND BATTERY. The words "Assault" and "Battery" are commonly used together, for the reason that the two offenses which they indicate are usually committed together. But the wrongs are separate and distinct.

An assault is an attempt or offer to inflict bodily injury upon another, accompanied by such circumstances as denote, at the time, an intention, coupled with the present ability to do violence to the person. Battery is the actual infliction of threatened violence; the consummation of an assault. Mere words of abuse will not constitute an assault; nor will a threat or offer to do violence, when it clearly appears that he who makes the threat or offer has no intention or no present ability to carry it into execution. But an *actual* intent or an *actual* present ability to injure the person is not necessary. It is sufficient that these are apparent and that the circumstances are such as to cause the person threatened to believe, on reasonable grounds, that such apparent intent and ability are real. Thus the pointing of an unloaded gun at a person who is ignorant of the fact that it is not loaded, the circumstances indicating an intention to shoot, will amount to an assault. The least touching of another's person, in anger or willfully or negligently, whether with the hand or with a stone or other weapon, is a battery.

Both assault and battery may, in some cases, be justifiable. Thus a father or a schoolmaster may chastise a child, within proper bounds and in the process of rightful discipline. So a person is justified in using all necessary means, even though obliged to resort to force, to protect and defend his person, the person of his servant, or of one of his family, or his real or personal property. The force employed in defense, however, must be no greater than the emergency requires; for any excess of violence the person using it will be responsible.

Assault and battery are both civil and criminal offenses. As civil wrongs they are classified under the head of torts, and as crimes under that of misdemeanors.

In the domain of criminal law, certain assaults are known as aggravated assaults, and are followed by a more severe punishment. Such are assaults with intent to kill or with intent to commit rape, and assaults upon magistrates in courts of justice, with knowledge of the official character of the persons assaulted.

ASSAY, or **ASSAYING**, is the process employed in determining the proportion of pure metal in a metallic ore or in an alloy. This method of analysis is more generally followed in the examination of compounds of silver and gold, but is likewise resorted to in the investigation of ores of iron, copper, tin, zinc, bismuth, antimony, mercury, and lead. In manufactured articles, also, such as silver-plate and gold-plate, some foreign metal (generally copper) is present, to impart hardness to the metal; and in Great Britain, each article is assayed at the Goldsmiths' hall, previously to being sold, so as to determine the exact richness of the metal whereof it is made. In the A. of compounds containing silver, the apparatus employed is a *cupel*—a small basin-shaped vessel made of bone-ash; and a *muffle*, composed of fire-clay, about 8 in. in length and 3 to 4 in. in diameter, shaped like a miniature railway tunnel, open at one end, closed at the other end, and having numerous slits or air-holes along the side. The more simple A. of silver con-

sists in the examination of argentiferous lead ore. By a preliminary process, the sulphur is separated (see LEAD); and weighed fragments of the mixed lead and silver being placed on cupels, the latter are introduced into the muffle, which has been previously heated in a furnace, where it still remains. The fire is then increased, and air being admitted to the muffle, the oxygen of the air unites with the lead, forming oxide of lead (PbO), which in part volatilizes through the openings in the side of the muffle, and in other part sinks into the porous bone-earth of which the cupel is made. Whilst the lead is thus carried away, the silver remains behind as a molten metallic globule, and when the last traces of lead-fumes leave the silver bead, the latter suddenly *lightens*, and immediately thereafter becomes brilliant and white. On being slowly allowed to cool, the globule of silver may be weighed, and the amount of pure metal thus determined. The use of the cupel during this process has led to the term *cupellation* being employed in place of A. When silver contains copper, which it does in ordinary coinage and silver-plate, it becomes necessary to mix lead with the alloy before attempting to separate the copper. The manner in which the lead is generally added is to roll the alloy of silver and copper in a piece of sheet-lead or lead-foil, and place the whole package on the cupel. During the heating in the muffle, the lead oxidizes as usual, and in part passing into the bone-earth of the cupel, carries the copper with it. The amount of lead required to effect the separation of copper from silver in this way is given in the following table:

Standard of silver in one part.	Amount of copper Alloy in one part.	Quantity of lead necessary for one part of alloy.	Quantity of lead in relation to that of copper.
1000	0	$\frac{8}{10}$ part.	
950	50	$\frac{3}{3}$ parts.	60 to 1
900	100	7 "	70 " 1
800	200	10 "	50 " 1
700	300	12 "	40 " 1
600	400	14 "	35 " 1
500	500	16 to 17 "	32 " 1
400	600	16 " 17 "	27 " 1
300	700	16 " 17 "	23 " 1
200	800	16 " 17 "	20 " 1
100	900	16 " 17 "	18 " 1
Pure copper.	1000	16 " 17 "	16 " 1

The metallurgic chemist, while performing an A., can determine, by the examination of the stains on the cupel after the process has been finished, what metal may have accompanied, and been separated from, the silver, even in minute quantity. Thus, lead alone imparts a straw-yellow or orange stain; copper, a gray or dark-brown tint; and iron, a black stain.

During the A. of silver by the foregoing or *dry* method, a certain loss of metal generally occurs, which averages 2 parts in 1000; and this circumstance has induced the authorities in the mints of Great Britain, France, and other European kingdoms, as well as the United States, to adopt a *humid* process for the A. of silver, which will determine the value of a silver alloy to within 0.5 (or half a part) in 1000. The humid or wet A. consists in dissolving the compound of silver in nitric acid of density 1.25, and thereafter adding a solution of common salt (chloride of sodium, NaCl), which causes the precipitation of the chloride of silver AgCl in white flocculi. The common salt is made of a definite strength, and is poured out of a measured or graduated vessel, till all further precipitation of the silver ceases, when the amount required of the solution of common salt is read off, and by a simple calculation its equivalent in pure silver is obtained.

The A. of gold ores is conducted in a manner similar to that of silver. When the ore contains gold, lead, and copper only, it suffices to mix more lead with it, and heat in the cupel in the muffle furnace, when the lead and copper sink into the cupel, and the gold forms a globule on the upper surface. The proportion of lead required is regulated by the amount of copper present in the alloy.

Proportion of gold contained in one part of the alloy.	Quantity of lead necessary to completely remove the copper by cupellation.
1000 thousands	1 part.
900 "	10 parts.
800 "	16 "
700 "	22 "
600 "	24 "
500 "	26 "
400 " and under.	34 "

When the gold is accompanied by silver as well as copper, iron, and lead, it is necessary in the first place to subject the alloy to the A. process in the ordinary way, which

gets rid of the copper, iron, and lead, but leaves the silver still incorporated with the gold. The weight of this residual button gives the combined weights of the silver and gold present in the alloy. The method of separating the silver from the gold is called *parting*, and consists essentially in acting on the alloy with hot nitric acid, which dissolves away the silver, forming the soluble nitrate of silver, AgNO_3 , and leaves the gold undissolved. When the silver is present in small proportion, the gold assumes a protective influence, and keeps the nitric acid from acting on the silver; and to effect this separation satisfactorily, it is necessary that there should be about three parts of silver to one of gold. As that proportion does not occur naturally, or in any kind of manufactured gold-plate, it is requisite to incorporate some silver with it. This is generally accomplished by taking the proper quantities of gold and silver, wrapping them up in a piece of lead-foil, and heating on a cupel. The lead, during its disappearance from the heating vessel, causes the most intimate amalgamation of the silver and gold, which are left on the cupel as a metallic button. The latter, on being allowed to cool, is beaten out on an anvil with a smooth hammer, and is then passed through steel rollers, which yield a ribbon of alloy about the thickness of an enameled address-card. The ribbon of metal being coiled up, is technically called a *cornet*, and when introduced into the flask with nitric acid, the entire solution of the silver is accomplished, whilst the gold is left as a brown-colored spongy mass, of the shape and size of the cornet. To give the metal the appearance and compactness of ordinary gold, the very friable metallic ribbon is gently transferred from the *parting glass* to a crucible by inverting the former into the latter; and the liquid which runs in with the gold being poured off, the crucible and its contents are raised to a red heat in a furnace, when the gold recovers its beautiful yellow color and metallic luster, and at the same time becomes soft and flexible. The gold is now pure, and in a fit condition to be weighed, and the amount obtained indicates the proportion of pure gold in the original alloy. As the quantity of silver which is required to be present during this process, in order that the *parting* by nitric acid may readily take place, is three parts of silver to one of gold, it is customary to call this department of a gold *A. quartation* or *inquartation*.

During the *A.* of silver or of gold, it is necessary to guard against any sudden increase or decrease in temperature. Independently of the probable loss of metal through the fracture of the cupels, it is found that when the final buttons of pure metal are obtained on the red hot cupel, if great care be not taken to cool the whole very slowly, the bead of gold or silver *spits*, and little portions are thrown off.

The mode of assaying gold now described cannot always be followed out in the examination of jewelry and other manufactured articles, as, though only a few grains are required for the *A.*, yet the removal of such might entail the destruction of the article, and in such circumstances the *touchstone* is resorted to. This stone was originally brought from Lydia in Asia Minor, and consisted of a cross-grained quartz saturated with bituminous matter, but black basalt and other stones are now employed for the same purpose. The manner of using the stone is to draw a streak upon it with the auriferous article; and from the color of the streak the richness of the gold can be very accurately determined by the practiced assayer. The subsequent action of nitric acid on the golden streak serves still further as a means of determining the purity of the metal, as the acid readily dissolves the copper and silver, and leaves the gold.

ASSAY OFFICE, UNITED STATES. An assay office differs from a mint only in the fact that it stops short of the coinage. Bullion is received here, is assayed in order to determine the precise proportion of fine gold or fine silver which it contains, is refined and melted for coining, and shipped to a mint for the latter purpose. Assay offices were established in New York city, 1854; in Denver, Col., 1864; in Boise city, Idaho, 1872. Since then the office in Denver has been made a branch mint, the branch mint in Charlotte, N. C., established 1835, has been changed into an assay office, and other assay offices have been established in Helena, Mon., and St. Louis, Mo. The *A.* office in New York has a superintendent, assayer, and melter and refiner. The others have an assayer in charge and a melter.

ASSA'YE, a village in the territory of the Nizam, lat. $20^{\circ} 18' \text{ n.}$, and long. $75^{\circ} 55' \text{ e.}$ It stands in the doab, or fork, of the Juah and Kaitna. *A.* claims notice chiefly as the scene of the first great victory of the duke of Wellington, then major-gen. Wellesley, won on the 23d Sept., 1803. The British troops in action were only about 4500, while the Mahrattas under Scindia and the rajah of Berar numbered 50,000, of whom 10,000 were commanded by French officers. Ninety-eight pieces of cannon, 7 standards, all the baggage, and a large part of the ammunition of the Mahrattas fell into the hands of the conquerors, whose military supremacy was soon acknowledged over a great portion of India. In 1851, a medal was struck in commemoration of the victory.

ASSEGAÏ (a Berber word), a short spear used by natives of South Africa, especially the warlike Zulus, with a very thin shaft of hard wood of about five feet in length, and an iron blade secured by a strip of raw hide. When used for throwing the blade is convex on one side and concave on the other, for the purpose of transmitting a rotary motion.

ASSELYN, JAN, 1610-60; a Dutch painter, pupil of Isaiah Vandervelde, and distinguished in landscape and animal pictures. He was one of the first Dutch artists to introduce Claude Lorraine's fresh and clear manner. There are several of *A.*'s pictures in the galleries of Amsterdam.

ASSEMANI, STEPHEN EVODIUS, 1707-82; nephew of Joseph Simon. He followed his uncle's studies, and was also librarian in the vatican, but was promoted to be archbishop of Apamea. He left a work on oriental manuscript literature.

ASSEMBLY (*assemblée*), in the conduct of an army, is the second beating of the drum before a march, at which the soldiers strike their tents if encamped, roll them up, and stand to arms.

ASSEMBLY, GENERAL, in Scotland, Ireland, and the United States, denotes the highest court of the Presbyterian church. It differs from the Anglican convocation at once in its constitution and in its powers, representing as it does both the lay and the clerical elements in the church, and possessing supreme legislative and judicial authority in all matters purely ecclesiastical. The general A. of the established church of Scotland consists of representatives, clerical and lay, from all the presbyteries of the church. The royal burghs of Scotland also return elders to the general A. of the established church, and each of the Scottish universities sends a representative. The A. meets once a year, in the middle of May, at Edinburgh, and sits for 10 days. Its deliberations are presided over by a moderator, whose election is the first step in the proceedings, after a sermon by his predecessor. In former times, this office was sometimes filled by laymen: among others, in 1567, by George Buchanan. In modern times, the moderator is always a clergyman. 84 presbyteries, composing 16 synods, return members to the general A. of the established church of Scotland. Its relation to the state is represented by a royal commissioner, who exercises no function in the A. beyond that of adding by his presence the sanction of the civil authority to its proceedings. The other functionaries are a principal and a deputy clerk, both clergymen, a procurator, and an agent. All business not dispatched during the session of the A. is referred to a commission, with the moderator as convener, which meets immediately after the dissolution of the A., and again quarterly. The general A. of the free church of Scotland, which has 16 synods comprising 71 presbyteries, and of the Irish Presbyterian church, is similarly constituted, the principal point of difference being the absence of the royal commissioner. The General Assembly of the Presbyterian church in the United States comprised, 1890, 213 presbyteries (30 synods), mostly in the northern states. Unsuccessful efforts to reduce the large number of representatives (one for every 24 members of a presbytery) have been made for successive years. This assembly meets annually in May, but has no stated place of assembly. The General Assembly of the (southern) Presbyterian church comprised, 1890, 71 presbyteries (13 synods), which seceded from the northern body in 1861, and have refused to enter into the old relations. This body meets annually in May. The United and the Cumberland Presbyterian churches have their annual general assemblies, the Reformed Presbyterian church its "General Synod."

ASSEMBLY, NATIONAL (France). The states-general (q.v.), convoked by Louis XVI. of France, and opened May 5, 1789, consisted of the two privileged orders, clergy and nobles, and of the tiers-état or commons. The privileged orders refusing to join the third estate and deliberate in a common chamber, the latter, of its own authority, June 17, assumed the title of *Assemblée Nationale*, and the right to act in the name of France. The court attempted to annul this resolution in a royal sitting, June 23; but the deputies of the third estate, along with the liberal members of the other two orders, had bound themselves by oath not to separate until they had given France a constitution, and had declared every attempt at violence on the part of the court, treason. They refused to quit the common hall, and the court yielded, and commanded the nobles and clergy to join the national A. This was the beginning of the revolution, and the A. proceeded with astounding rapidity to metamorphose old France. The abolition of all privileges on the 4th of Aug. was followed by that of hereditary jurisdiction, and of restraints on religion and the press, and by the declaration of the rights of man (q.v.). In Feb., 1790, the monastic orders were suppressed, and all remnants of feudalism swept away; in March, *lettres de cachet* and the oppressive salt-tax were abolished; in June, all orders and titles of nobility. In July, non-Catholics had the property confiscated from their ancestors restored; Jews were relieved from personal taxation; and game-laws done away. A decree of Oct. 18 abolished the cruel criminal penalties of Louis XIV. In Jan., 1791 all corporations and guilds were abolished, and free-trade introduced. In Feb., political rights were conceded to Quakers; in May, the customs at city gates were abolished; in June, the torture; the violation of the secrecy of letters was also declared criminal. In Sept., all citizens, of whatever color or religion, received political rights.

The principles on which the assembly proceeded were the sovereignty of the people, the independence of the communes, the limitation of the royal power through a conditional veto (q.v.), the separation of the political authorities, and the responsibility of ministers. Accordingly, the A., shortly after it was constituted, declared that to it alone, subject to the royal veto, belonged the legislative power. Several decrees, in Sept., 1789, determined that the legislative body should form only one chamber, and should be renewed every two years; other decrees declared the king inviolable, and the throne inalienable. A decree of 7th Nov. forbade the deputies to undertake the place of ministers; in Dec., the new organization of the communes was begun. Jan., 1790.

France was divided into departments; in April, trial by jury was introduced; in May, it was declared that the right of war and peace belonged to the nation alone, that is, to the A.

In regard to finance, which had been the immediate cause of the assembly's being convoked, the reforms were equally thorough. It was decreed at the outset that taxes were to be apportioned and raised without regard to rank or person. Then followed the approval of a loan of 80 millions of francs. A decree of Nov., 1789, ordered the publication of the public accounts; another in Dec. established a national bank. In Mar., 1790, appeared the first law sanctioning the sale of 400 millions' worth of the national domains; and in April, another ordering the issue of *assignats* (q.v.) on the national property; in Oct., these assignats were declared to bear no interest. These measures were followed, in the beginning of 1791, by a series of laws regarding coining, taxation, encouragement to industry, revenue-management, etc. A committee of the A. appointed to reform church matters, made a complete overturn of the old ecclesiastical system. After a declaration that Catholicism had ceased to be the state religion, tithes were abolished, and church property confiscated. Church ornaments and valuables were appropriated as patriotic gifts to the state; the civil jurisdiction of the bishops was taken away, and monks and nuns were freed from their vows. The clergy were put under a civil constitution. Each department was a see, and the communes ruled and paid bishop and curés. All the clergy were amenable to the civil courts, without appeal to the pope or the interference of any ecclesiastical authority whatever. Every clergyman had to take an oath accepting this constitution, which led to the emigration of a number, and subsequently to enactments of excessive rigor against refractory priests (*prêtres insermentés*).

The A. having thus laid the revolution on a foundation of 3250 decrees, and having sworn to the new constitution, and got it accepted by the king, closed its sittings, Sept., 30, 1791. From its having framed the constitution (which lasted only 12 months), this assembly is usually called the constituent A. It made way for the LEGISLATIVE ASSEMBLY, which was to reform the civil and criminal laws in accordance with the spirit of the new constitution. A decree had provided that no member of the constituent should be returned to the legislative A. But the democratic party received such preponderance at the elections, that the A. forgot its mission from the very first, and commenced a war with the remnants of the royal authority, which ended, Aug. 10, 1792, with the overthrow of the throne and the suspension of the king. The constitution had provided for an appeal to the nation in extreme cases, and the legislative A. now exercised that right by convoking a *national convention* (q.v.), which, being invested with the powers of the sovereign, was to decide on the fate of the monarchy, and remodel the whole political system.

The title of national A. has been assumed by various other parliamentary bodies, originating in popular commotions, and aiming at radical political changes; as the French A. that met after the revolution of Feb., 1848, followed, April, 1849, by a legislative A.; the German national A. at Frankfort; and the Prussian national A. Under the existing French republic, the senate and the chamber of deputies unite to form the national A.

ASSEMBLY OF DIVINES, or WESTMINSTER ASSEMBLY, a celebrated convocation appointed by the long parliament for settling the doctrine, liturgy, and government of the church of England. It consisted of 120 clergymen and 30 laymen—10 of whom were lords and 20 commoners—together with 4 clerical and 2 lay commissioners from the church of Scotland. Among the more distinguished of the divines were Usher, Saunderson, Reynolds, Brownrigg, Ward, Twisse, Lightfoot, Gataker, Burges, Goodwin, Calamy, and Nye; of the laymen, Selden, Prideaux, the two Vanes, Rouse, Pym, Whitelocke, St. John, and Maynard. The Scottish divines were Henderson, Gillespie, Rutherford, and Baillie. 25 of those whose names were contained in the ordinance calling the assembly, which was dated 12th June, 1643, never appeared at the discussions, one or two of them having died about the time of the first meeting, and the others fearing the displeasure of the king. To supply the place of these absentees, some additional members, called the superadded divines, were summoned to attend. This notable assembly held its first meeting on the 1st of July, 1643, and continued to sit till the 23d Feb., 1649, during which time it had met 1163 times. Its most important work was concluded long before that time. One of the first things it did was to give its sanction to the *Solemn League and Covenant*, against which Dr. Burges alone stood out for several days. The Presbyterians formed a large majority in the assembly, and exercised a corresponding influence on its decisions. In doctrine, the members were almost unanimous; but on the subject of church government, opinions extremely opposite were maintained with keenness, especially on the question touching the sphere and limits of the civil power in matters ecclesiastical. The principal fruits of its deliberations were the *Directory of Public Worship*, submitted to parliament April 20, 1644; the *Confession of Faith*, Oct. and Nov., 1646; the *Shorter Catechism*, Nov. 5, 1647; and the *Larger Catechism*, Sept. 15, 1648. These several formularies, which contain a clear and rigid embodiment of Calvinistic theology and Presbyterian church government, constitute to this day the authorized standards of the Presbyterian churches of Scotland, Ireland, and England. The *Directory of Public Worship* was ratified by both houses of parliament, Oct. 2, 1644, and the doctrinal part of the *Confession of Faith* in Mar., 1648. An order of the house of commons, Oct. 13, 1647, ordained that the Presbyterian form of church government

should be tried for a year, but no further legislation followed. What has hitherto been known as to the details of the proceedings of this remarkable convocation, has been derived chiefly from the *Letters of Baillie*, and Lightfoot's *Journal*.—See Hetherington's *History of the Westminster Assembly* (1843); and the 2d volume of Masson's *Life of Milton*, published in 1871 (pp. 509–527), where a list of the members, with brief biographic notices, is given.

ASSEN, a t. in the Netherlands, 15½ m. by rail s. of Groningen; pop. abt. 8000. A. is on the Horn-Diep, and has canal communication with the Zuyder Zee. Certain tumuli near the place are called “giants' graves.”

ASSENT, ROYAL, is the regal act by which the sanction of the crown to bills which have passed through both houses of parliament is given.

ASSER, JOHN, the learned and congenial biographer of Alfred, was a monk of St. Davids, from the Latin name of which, *Menevia*, he is termed in the old records *Asserius Menevensis*. About the year 880, his reputation for learning and piety procured him an invitation to the court of Alfred, where he resided at intervals during the rest of the king's life, assisting him in his studies, and enjoying an affectionate confidence, of which he seems to have been every way worthy. The king promoted him to various dignities, and finally made him bishop of Sherburn. The *Saxon Chronicle* fixes the date of his death in the year 910. Several works have, with more or less authority, been attributed to A. The only one undoubtedly his, by which we can now judge of him as a man and a writer, is his *Annales Rerum Gestarum Aelfredi Magni*. This simple and most interesting narrative was first published in 1574 by Archbishop Parker. Its trustworthiness has recently (1842) been questioned by Mr. Thomas Wright, in the article “Asser” of his *Biographia Britannica Litteraria*. This gentleman has assuredly made the most of the objections to its reliability that can be legitimately urged. Lingard and Dr. Pauli have replied to these, and, at present, the general impression of scholars of Anglo-Saxon literature is that there is no good reason for doubting its general accuracy and fidelity. The best edition is that of Wise (Oxf., 8vo., 1722).

ASSES, FEAST OF. See **FOOLS, FEAST OF**.

ASSESSORS may be defined as persons who are sometimes associated with judicial functionaries, to assist in the argument and procedure before them, and to advise their judgments. They are called A. because, according to the Latin derivation and literal meaning of the word, they sit *side by side* with others. They may be usefully employed by persons in judicial stations whose previous education and pursuits scarcely qualify them for the duties cast upon them. A. are usually barristers or advocates learned in the law, and familiar with judicial proceedings. By the 5 and 6 William IV. c. 76, commonly called the municipal corporation act, it is, by section 37, enacted that the burgesses shall annually elect from among those qualified to be counselors, two auditors and two A., the former to audit the accounts of the burgh, and the latter to revise the Burgess list. In the ecclesiastical law of England, a bishop, who is a spiritual judge, is assisted by his chancellor, as the episcopal assessor, and who, in fact, holds courts for the bishop. But in the case of a complaint against a clergyman, for any ecclesiastical offense under the church discipline act (the 3 and 4 Vict. c. 86), the bishop is directed to inquire into the matter, assisted by the three A., of whom the dean of his cathedral, or one of his archdeacons, or his chancellor, must be one, and a sergeant at law, or an advocate who has practiced five years in the court of the archbishop of the province, or a barrister of seven years' standing, another.

The judges of the common law courts, and the queen's counsel, being sergeants, are, as a condition of their offices, A. of the house of lords, advising the house on points of law which may be propounded to them by their lordships.

ASSETS. This is one of those terms in the law of England which in itself bears evidence of a Norman origin. It is derived from the French word *assez*, or more exactly, in Norman-French, *assetz*, “enough” or “sufficient,” signifying the property of a deceased person, which is sufficient in the hands of his executor and heir for the payment of his debts and legacies. In strictness, therefore, the term is not applicable to the property of a person who dies intestate, and without any debts to be paid. In general acceptance, however, it is understood to mean the property left for distribution by a deceased person, whether testate or intestate; and in commerce, and also in bankruptcy and insolvency, the term is used to designate the stock in trade and entire property of all sorts belonging to a merchant or to a trading association.

A. are either *personal* or *real*, the former comprehending such goods, chattels, and debts as devolve on the executor; and the latter including all real estate, whether devised or descending to the heir at law. In connection with this distinction, A. are also said to be A. *by descent*, and A. *in hand*, the former of these being recoverable from the heir to whom the land descends, and so far as such lands will extend—A. *in hand*, again, signifying such property as a person leaves to his executors sufficient for the clearing of burdens and bequests affecting his personal estate. A. are also in their nature either *legal* or *equitable*, according to the nature of the remedy which may be used by creditors against the executor or heir. Where there are several creditors of equal degree, the executor is bound to pay him who first obtains judgment for his debt; and he cannot resist on the ground that nothing will be left for the other creditors. If, after exhausting the whole

A. which have come to his hands, by the payment of debts in due order, he be afterwards sued by a creditor remaining unpaid, he is entitled to protect himself by an allegation that he has fully administered, or technically by a plea of *plene administravit*; and upon this plea the creditor is entitled to judgment that he shall be paid out of any other A. that shall come to the defendants, which is called a judgment of A. *in futuro*.

A. is not a technical term in Scotland, but it is nevertheless much used in the legal business of that country.

ASSID' IANS. See CHASIDIM.

ASSIENTO, i.e., treaty, a word specially applied to a compact between Spain and some foreign nation, according to which the Spanish government conferred upon the latter, under certain conditions, the monopoly of the supply of negroes for its American colonies. It was Charles I. of Spain who first concluded an A. with the Flemings. Next, a similar compact was entered into with the Genoese (1580 A.D.), the Portuguese (1696), and on the accession of Philip V. to the Spanish throne in 1702, with the French Guinea company, which from that time took the name of A. company, upon the understanding that for ten years it should have the exclusive right of annually importing 4800 negroes of both sexes to the continent and islands of Spanish America. The A. was next transferred to England at the peace of Utrecht in 1713, and made over by government to the South Sea company for 30 years, permission being also granted to the company to send yearly, during the term of contract, a ship, carrying 500 tons of goods, to these Spanish colonies. The misunderstandings that grew out of this last clause contributed not a little to the war that broke out between the two nations in 1739. At the peace of Aix-la-Chapelle in 1748, the English company having still four years to run, their rights were guaranteed to them; but they relinquished them at the Madrid convention of 1750, upon the payment of £100,000, and the concession of certain commercial advantages.

ASSIGN, To, in law, signifies to transfer or grant over to a third party a security, a right of credit, or other right, whether in possession or in reversion, granted by a party indebted or under obligation to the party assigning. The words of assignment are to A., *transfer*, and *set over*, and they operate to transfer both real and personal property. A *chose in action* (q.v.), contrary to the ancient principle, can now be assigned in England indirectly by the common law, and directly according to the principles recognized in the practice of equity. See INSOLVENCY.

ASSIGNATION is a legal term in Scotch conveyancing, analogous to the English word assignment (q.v.), by means of which the holder of any right, or the creditor in any obligation, or the proprietor of any subject not properly feudal (see FEUDAL SYSTEM), transfers his right or estate to a third party. The party making the A. is called the *cedent*, and the party in whose favor the A. is made is called the *assignee* or *cessionary*, and the act of assignment thus made is irrevocable, an element in the deed which has been traced to the practice of the French law, a source from which the Scotch lawyers of the 16th c. borrowed so much—the court of session itself being a mere copy of the parliament of Paris. A direct conveyance of a debt in France was termed *un transport*; the granter, *cédant*; and the grantee, *cessionnaire*; and these terms, derived from a Latin origin, were introduced into the Scotch law; and hence the names of the parties to an A., as we have stated. Unlike the English common-law view of the assignment, the Scotch A. has the effect of investing the assignee with the whole right, which was in the cedent, although according to the ancient practice, the A. gave, not simply the sum or subject assigned, but also the deed or written evidence of the right or thing assigned, a form arising from the circumstance of the instrument having been regarded as of the nature of a mandate or power of attorney to the assignee to make his claim and to act as in right of the cedent. In modern practice, however, it is usual to employ simply the terms “assign, convey, and make over,” which correspond with the real character of the deed.

ASSIGNATIONS, paper currency of Russia, issued by Catherine II., about 1770, to assist in carrying on the war against Turkey. Like similar experiments in other countries before and afterwards, the A. started at par, but rapidly declined to less than 25 per ct. About 20 years later, the A. were the general currency; but traders began to refuse them, and the most stringent edicts of Paul failed to force them into good standing. In the war with Napoleon, heavy issues were made, the value keeping steadily at about four roubles of paper to one of silver. The rate rose somewhat after the peace, and fluctuation became so troublesome that the government fixed the value by special law. In 1839, the silver rouble was made the unit, and the value of A. fixed at 3½ for 1 of silver. At the same time bills of credit were issued which have taken the place of the A.

ASSIGNATS. After appropriating to national purposes the land belonging to the church, the French national assembly (see ASSEMBLY, NATIONAL), instead of bringing it into the market at a time of insecurity, when its value was depreciated, issued bonds on the security of it, which were called *assignats*, as representing land assigned to the holder. This paper-money consisted chiefly of notes for 100 francs (£4) each, though many of them were for sums as low as ten or five francs, and even lower; and the first issue amounted to 400,000,000 francs. The first A., which were issued in the spring of the year 1790, bore interest; but subsequent issues did not. The facility of this plan of providing government income led to its being repeatedly had recourse to, as the property of wealthy emigrants—persons who abandoned their country in alarm—fell into the

hands of the rulers, and was confiscated, till the amount rose to the enormous sum of 45,578,000,000 francs, besides a great number of forged A. manufactured abroad, and smuggled into the kingdom. The value of the A. naturally soon began to decline, and confidence once gone, the declension became fearful. In June, 1793, 1 franc in silver was worth 3 francs in paper; in Aug., it was worth 6. The state took the most extreme measures to compel the acceptance of A. at their full nominal value. The effects of these were to cause the A. to flow back into the public treasury, to raise the prices of all commodities, and to make every one averse to have any dealings with the state. One of these consequences was attempted to be met by fixing a maximum of prices. But no one could compel producers and dealers to produce and sell at a loss; so that all business became disorganized. At last the value of A. came almost to nothing. Millions of individuals had suffered incalculable loss, and only a few, who had bought public lands with the A. that cost them little or nothing, had enriched themselves at the expense of the community. In Mar., 1796, a louis d'or (24 francs) brought 7200 francs in A. After this, they were withdrawn from the currency in 1796, and redeemed at $\frac{1}{30}$ of their nominal value, by *mandats*, a new kind of paper-money, which enabled the holder at once to take possession of public lands at the estimated value, while A. could only be offered at a sale. The *mandats* also soon fell to a seventieth of their nominal value, and were returned to government in payment of taxes or of land.

At length, in July, 1796, the system of paper-credit, so obstinately persisted in by government and so disastrous in its results to the public, came to an end. A law was passed, declaring that every one was entitled to transact business in whatever circulating medium he pleased; that the *mandats* should be taken at their current value; and that the taxes be received either in coin or *mandats* at that rate. The A. were executed on a coarse kind of paper, and the devices were so meager as to be easily counterfeited.

ASSIGNEE IN BANKRUPTCY. See ASSIGNMENT; INSOLVENCY.

ASSIGNMENT in American law is a transfer or making over (in writing usually) to another of property in possession or in action, or of any right therein; or the transfer of one's interest in property. Almost any valuable thing, present or prospective, may be assigned; but there are things excepted, such as the commission or pay of a public officer, the salary of a judge, right of action for fraud, rights *pendente lite*, personal trusts, or the duties of a guardian. To be valid in law, the subject of A. must at the time have an actual or prospective existence, although courts may hold an A. good where value rests on possibility only. Negotiable bills are assigned by mere indorsement, and then the holder can sue in his own name. In such case even an equitable defence that might exist between the maker and the original acceptor is barred out. The majority of assignments are made by insolvent debtors for the protection of creditors, and to obtain discharge from further obligation, and these are regulated by special statutes in most of the states. In some of these an A. must be for the benefit of all creditors equally. Personal chattels are usually transferred by bills of sale; sometimes by mere memorandum; any words showing the intent will answer. No consideration is necessary to support A. of a term. An A. of a policy of insurance, by consent of the underwriter, by statute, or otherwise, vests in the assignee all the rights of the assignor; but as such an instrument is not negotiable, the A. is only in equity, and even that may be forestalled by condition to the contrary expressed in the policy. An A. of dower is an act by which the share of a widow in a deceased husband's real estate is set apart for her, and may be made by the heir or his guardian, or the person in possession of the land subject to dower; or after legal proceedings by direction of the court, if voluntary A. be refused.

ASSIMILATION. See NUTRITION.

ASSING, LUDMILLA, b. 1821; a German biographer, the daughter of Dr. A., and niece of Varnhagen von Ense. She was taken by her uncle after the death of her parents, and filled the place of a child to him, receiving thereby a superior education. She wrote for newspapers and reviews, and in 1857 a biography of Elisa, countess Von Ahlefeldt. She edited and published after her uncle's death, two vols. of his *Denkwürdigkeiten*; in 1860, Alexander von Humboldt's letters to, and in 1861-62, the diaries of Varnhagen von Ense. The political matter in the diaries so offended the court, that she was prosecuted as a traducer of the royal family and other persons, and sentenced to eight months' imprisonment. But she had gone to Florence, and the punishment could not be inflicted. She immediately published the remaining volumes of the obnoxious diary, to which the court answered by the form of a trial and sentence to further imprisonment for two years. She was unhappily married, 1874; d. 1880.

ASSING, ROSA MARIA, 1783-1840; a German poetess, sister of Varnhagen von Ense. When young she was a teacher. In 1816 she married Assing, a physician in Königsberg, who took her to Hamburg, where her house soon became the resort of literary people, of whom one of the most eminent was the poet Chamisso. Mrs. A.'s poems were issued in a volume a year after her death.

ASSINIBOIA, district in Canada, formed in 1882 out of the Northwest Territory, containing abt. 95,000 sq.m. It is bounded on the n. by Saskatchewan, on the e. by Manitoba, on the s. by the U. S., and on the w. by Alberta. In A. are Qu'appelle, South Saskatchewan, and Souris rivers. Important places, Regina, the capital, on the

Canadian Pacific railroad, Qu'appelle, Moose Jaw, Livingstone, Chesterfield, forts Walsh and Pelly. See MANITOBA.

ASSINIBOINE, a river of British North America, rising in lat. $51^{\circ} 40'$ n., and about long. 105° e. Near lat. 50° n., and long. 96° w., at Fort Garry, it falls from the n.w. into the Red river (q.v.), which discharges its waters into lake Winnipeg. At a point 140 m. from its mouth, the A. is 230 ft. broad; its course measures about 400 miles. The river gives name to a tribe of Indians partly in Canada and partly in the United States.

ASSINIBOINES, an Indian tribe of the Dakota family, dwelling in the United States and British America, on the Montana border. They were once a part of the Yankton Sioux nation, but separated from them nearly 300 years ago, and since then have generally been their antagonists. It is said that the name A. is not used, other Indians calling them Stone Sioux, or Assinipwalak. There are about 3000 in the United States, and rather more in British America, where they extend from Mouse river to the Athabasca. The Methodists and Roman Catholics have missions among them.

ASSISI (*Assisium*), a t. of central Italy, is built upon a steep hill, in $43^{\circ} 5'$ n. lat., and $12^{\circ} 33'$ e. long. Pop. about 6000. It stands in a singularly picturesque situation, and is surrounded by a wall flanked with towers, and overhung by a lofty citadel in ruins. It is the birthplace of St. Francis, who here founded the convento sacro, the first monastery of the mendicant order that bears his name, a large and beautiful structure, and one of the earliest specimens of the Gothic style of architecture in Italy. The church and the galleries of the monastery contain fine paintings by Cimabue, Giotto, and other old masters. Besides the convento sacro, there are 11 other monasteries in A. Of these, the largest is the portiuncula, which has a richly decorated church, with a cupola by Vignola. In the last century, this place was a great resort of pilgrims, visiting the tomb of the saint, of whom 100,000 are said to have been assembled here on one day.

A. occupies the site of the ancient Assisium, a municipal t. of Umbria, and presents the remains of the forum, the baths, and the aqueducts of the days of the Romans. In the piazza, or square, there stands a beautiful portico of the ancient temple of Minerva, consisting of fluted Corinthian columns and a pediment. There are abundance of olive-trees, and some fine mineral springs in the vicinity. The t. has given title to a bishop since 240 A.D. It has manufactures of needles and files.

ASSISTANCE, WRIT OF, a direction by a proper court to the sheriff to put a party in whose favor judgment has been given, in possession of that to which the judgment declares him entitled.

ASSIZE. This word, literally signifying a "sitting" or "session," is a term used in the principal European legal systems, and very much in the same sense, or rather senses, in all, for it has more than one distinctive meaning. As is common with regard to most of our ancient legal technicality, the Latin language, in the first instance (*assideo*), and then the French (*assis*), appear to have led to its introduction into the phraseology of the law of England, and, it may be added, also of Scotland, although in the latter country it has a more limited application in judicial procedure than in England, A. being in Scotland the old technical expression for a jury. In England, this word may also signify a jury, and it is sometimes used to denote an ordinance, decree, or law. But in modern practice, it is commonly applied to the sessions or sittings of the judges of the superior law-courts, held periodically in each county, for the purpose of administering civil and criminal justice. These courts came into use in room of ancient justices in eyre, *justicia rei itinere*. They are now appointed by commissions issued twice a year to the judges of the high court of justice, two judges being generally assigned to each circuit. (These are the *general commissions*; *special commissions* are occasionally granted to certain judges to try certain causes and crimes.) By accompanying writs of *association*, certain persons are directed to be associated with the justices and sergeants, in order to take the assizes, etc., that a sufficient supply of commissioners may never be wanting. But, to prevent the delay of justice by the absence of any of them, there is also issued, of course, a writ of *si non omnes*, directing that, if all cannot be present, any two of them (a justice or sergeant being one) may proceed to execute the commission. These commissioners or judges of A. are sent twice in every year on *circuits* all round the kingdom to try by a jury of the respective counties the truth of such matters of fact as are then under dispute in the courts of Westminster hall; and occasionally a third circuit is appointed in the course of the year, for the purpose of jail delivery. The circuits (formerly eight) are, since 1875, seven in number—the midland, the south-eastern, the Oxford, the northern, the north-eastern, western, the north and south Wales circuit; and in going them, the judges or commissioners sit by virtue of four several authorities: 1. The commission of the *peace*; 2. A commission of *oyer and terminer*; 3. A commission of general *jail* delivery. The other authority is, 4. That of *nisi prius*, which is a consequence of the ancient commission of A. being annexed to the office of justices of A. by the statute of Westminster the second (13 Edw. I. c. 30); and it empowers them to try all questions of fact issuing out of the courts at Westminster that are then ripe for trial by jury. These, by the ancient course of the courts, were usually appointed to be tried at Westminster in some Easter or Michaelmas term, by a jury returned from the county wherein the

cause of action arose; but with this proviso, *nisi prius*, unless before the day prefixed the judges of A. should come into the county in question, which in modern times they have invariably done in the vacations preceding; so that the trial has always, in fact, taken place before those judges. And now, by the effect of the statute 15 and 16 Vict. c. 76 (the Common Law Procedure Act, 1852), the course of proceeding is no longer even ostensibly connected with a proviso at *Nisi Prius*, but the trial is allowed to take place without the use of any such words in the process of the court, and, as a matter of course, before the judges sent under commission into the several counties. In the terms: Assize of Clarendon, Assize of Northampton, Assize of Arms, Assize of the Forest, etc., the word is used in the old sense as an equivalent for edict or decree. These edicts, says Stubbs, in his *Constitutional History of England*, are the only relics of the legislative work during the period of the reign of Henry II., and he compares them to the capitularies of the Frank Kings, or the edicts of the Roman praetors. This was the earliest meaning of the word, but secondarily it came to mean a form of trial established by some law, and lastly the court that held such trials, the last meaning being that which is accepted at the present time. In the expression "Assize of Jerusalem" it simply means a law.

ASSIZE OF CLARENDON. See CLARENDON, CONSTITUTIONS OF.

ASSIZE OF JERUSALEM, a body of laws originally framed by Godfrey de Bouillon (q.v.) and the other crusaders after the capture of Jerusalem in 1099, based in its essential features upon the system of France, and faithfully reflecting the spirit of the feudal civilization at the height of its development. It is composed of two parts, the first relating to the assize of the high court of justice, a sort of council of state presided over by the king or in his absence by one of the great officials of the crown, and comprising all the liege vassals of the kingdom; the second providing for a court of burgesses presided over by the viscount of Jerusalem, forming a kind of lower house. A careful revision of both civil and criminal laws by an able body of jurists resulted in the drawing up of two codes, called the *Letters of the Holy Sepulchre*, from the fact that they were kept in a coffer in the church of the Holy Sepulchre. These were destroyed when Saladin captured the city in 1187, and the assizes of Jerusalem, as we know them, are the work of jurists who, after the removal of the Christian seat of government to Acre, attempted to reproduce as much of the former legislation as survived in existing customs or could be recalled to memory. The collection of laws as made by these so-called *ultramarine* jurists passed from Jerusalem to Cyprus, from Cyprus to Constantinople, and thence to the Morea, adapting itself in each instance to the customs of the people among whom it was established, but retaining throughout as its prevailing characteristic, an absolute independence of all such authority as did not originate in the feudal system. See M. Beugnot's collection, 1841-43.

ASSIZES. See ASSIZE.

ASSMANNSHAUSEN. See ASMANNSHAUSEN.

ASSOCIATED PRESS. See PRESS ASSOCIATION.

ASSOCIATE SYNOD, ASSOCIATE PRESBYTERY, etc., designations adopted among the dissenters from the church of Scotland. See UNITED PRESBYTERIAN CHURCH. America has also an associate synod and an associate reformed church, both sprung from the Scottish secession.

ASSOCIATION. See CO-OPERATION; also, SOCIETIES, LEAGUE, COMPANY.

ASSOCIATION OF IDEAS. This is a phrase of great importance in the philosophy of the human mind, as expressing the most pervading fact at the foundation of our intelligence. By giving, therefore, a somewhat full exposition of this subject, we are able to explain, at once, a considerable number of the complex phenomena of mind in a more satisfactory way than by treating the several phenomena separately. What is meant by association of ideas, is familiarly illustrated by such occurrences as the following: When we see the sky becoming overcast, we think of rain as about to follow, the notion of rain not having previously been present to our mind. When we hear the church-bells, we are apt to think of the crowds in the street, or of some of the other circumstances of public worship. When we pass a house, we are reminded of its occupier; and meeting a person we know, we may be carried in thought to his office, and from that to other persons holding the same office, and so on. If an object is before my eyes, as a mountain, I am said to receive an impression or sensation of it, in consequence of the actual presence of the thing; but it is possible for me to remember the mountain, or to have an idea of it, when far away from the reality, in which case there must be some power in the mind itself, different from the susceptibility to present objects, a power of retaining, reviving, or resuscitating those states at first induced by contact with the actual. Besides the sights, and sounds, and touches caused by contact with real things, we are greatly occupied with sights, sounds, and touches remembered, anticipated or imagined, which is to live in a world of ideas; and it is in this world that the process termed association has its sphere. When an idea is brought before the mind without its original, as when I picture to my mind the late duke of Wellington, the circumstance is owing to the mention of his name, or of some incident connected with him; and my remembrance of his personal appearance, as I have seen him when alive, is said to be the result of an association existing in my mind between two ideas, so that the one is able to recall or restore

the other. The association between names and things comprehends one of the most extensive applications of the power in question.

The circumstances under which one idea brings forward another into the view are principally these two—viz., first, previous *proximity*; and second, *likeness*. The terms “contiguity” and “similarity” are used in mental philosophy to express them. The first is exemplified in the examples of association given above; for in most of those it will be found that the conjoined notions have been frequently in the view at the same time, in consequence of which they have, as it were, grown together, or become part of the same whole. Thus, we have often noticed the darkened sky followed by a shower; the two facts have occupied the attention simultaneously, and, in virtue of some power belonging to our mental framework, they have cohered into an inseparable couple or aggregate in the mind. This is *proximity*, or *contiguity*. When one idea suggests another which was never in company with it before, it is generally through the force of some *likeness* between the two. I meet an old man in the street with a very peculiar face, which reminds me of the bust of Socrates. These two things had never accompanied one another in my mind before, and therefore it could not be the force of *proximity* that made the second to arise at the instigation of the first; but there was a certain amount of *likeness* or *similarity* between the old man’s features and the features of Socrates, as represented to us in the bust; and it is a fact of our constitution, no less certain and no less important than the foregoing, that in cases where something new before the mind has a strong cast of resemblance to something formerly observed or conceived by us, but not at present thought of in any way, the present is apt to recall that past idea, whatever it may be. By the force of *likeness*, the traveler in new countries is constantly reminded of the scenes and objects familiar to him, and so is induced to draw comparisons between the one and the other. Identification and comparison both imply that things are brought together by virtue of their similarity, they not having been in company before. The principle of *proximity* operates most in memory, habit, and routine; *similarity* has to do with invention and originality, and is essential to the processes of reason and imagination.

Law of Contiguity.—The principle of association by *proximity* is not confined to ideas. We must state it in a more comprehensive form, in order to comprise the full sphere of its application; for our mechanical habits are formed through the very same power of our constitution that enables us to recall or remember ideas. The taught movements of a soldier or of a skilled workman are connected together so firmly that one succeeds to another almost of its own accord. Everything of the nature of acquisition supposes a plastic property in the human system, giving permanent coherence to acts that have been performed together.

The following is a general statement of the law under consideration:

Actions, sensations, states of feeling, and ideas, occurring together, or in close succession, tend to grow together, or cohere in such a way that when any one of them is afterwards presented to the mind, the others are apt to arise.

And first, as to association of actions, or voluntary movements. When we perform a train of movements without any further aid of the will than to commence the series, there must be a fixed connection between each and the one that follows, and this connection may be either instinctive or acquired. There are various cases of instinctive trains, such as the action of the heart, lungs, and intestines, and the movements of deglutition. When a morsel of food reaches the back part of the mouth, the muscles of the throat seize hold of it, and transmit it to the stomach, independent of our will. The connected movements in this case are provided for in the original structure of the nervous and muscular system. In walking, there is partly an instinctive tendency to alternate the limbs, and partly a confirming acquisition, the result of practice. But in those complicated operations that human beings are taught to execute in the various avocations of life, the associating principle is everything. The apparently simple and easy act of taking food is a complicated acquisition; in other words, an extensive group of associated movements. The seizing of the morsel is followed by the movement of the arm that carries it to the mouth; the mouth is opened simultaneously; after which follow the processes of biting and chewing; all which take place with the certainty of a machine, and without effort or attention directed to them. These associations were originally built up by slow degrees. “As a general rule, it takes many repetitions to cement so firm a union between successive and simultaneous movements as is implied in the above instance.”

A good example of the association of movements is furnished in our requirement of spoken language, as in committing to memory words, sayings, and passages of books. When a child has perfectly acquired the Lord’s prayer, the chain of association is so firmly knit, that the articulation of the words “Our Father” is followed irresistibly with those next succeeding, and so on to the end. The cohesion in this case is between the vocal movements corresponding to the enunciation of the words. Having gone many times through this one definite succession, the stream of nervous power, in some way that we cannot at present explain, acquires a tendency to fall into this one definite track, and in future to bring on the movements in the exact order that they have so frequently followed.

It is not merely actual movements that can be joined together in this way, but the

ideas of movement; for a man, meditating in language, and not speaking out his thoughts, can consolidate his trains so as to remember them afterwards.

When we proceed to sensations and the ideas, or subsequent traces, of sensations, and take along with these the variety of our movements with their ideas, we find an unlimited scope for the associating principle; and the consequences of its operation spread far and wide in the domains of our happiness, our knowledge, and our active capacity. It is only possible here to present a few illustrative examples.

In the various mechanical acquirements, which include the whole of special handicraft, industry, and skill, as well as the use of the bodily members in the more general actions of daily life, there may be traced the linkings of actions with actions, or actions with sensations and ideas. The helmsman steering a ship associates in his mind each deviation of the needle from the proper point with the specific muscular exertion to be applied to the wheel to rectify the ship's direction. The workman fabricating in wood, metal, or stone, acquires a firm connection between each aspect of the material and the muscular power to be applied to bring it one step nearer the desired form. The power of copying anything we see, as in writing, drawing, molding, etc., when completely mastered, is made up of associations between a visible appearance and the train of movements calculated to reproduce it. After practice, all this is done, as it is called, mechanically, or without those operations of considering, willing, and remembering directions, that are essential to the learner in a new art. The associations that grow up after a certain amount of practice, are in this case associations between movements and appearances to the eye, or sensations of sight. In the greater number of crafts, the eye is the guiding sense to the operator, but not in all. Sometimes the effect is vocal, as in performing music, and in making and tuning musical instruments, in speaking, etc. In other arts, the touch is the guiding sense, and in some, as in cookery, the taste and smell direct the operator. Each accomplished workman has in his mind many hundreds, not to say thousands, of couples or aggregates of definite movements with other movements and with sensations, contracted in the course of his apprenticeship to his calling.

If we inquire into the circumstances that favor and promote this extensive circle of acquisitions, we shall find several that may be named as of importance. In the first place, a *natural activity of temperament*, or an abundant flow of power to the active members, as shown in a great and various mobility of the frame, is a good basis of bodily acquirements. When the force of the system runs feebly towards the muscular framework, being perhaps expended in other ways, as in the thinking powers, more time is requisite to attain difficult mechanical arts. Another important circumstance is *the acuteness or delicacy of the sense* involved in the operation. A keen eye, sensitive to minute degrees of effect, is wanted in all the various occupations that turn on visible appearances; a good ear is indispensable to music and the arts of producing sounds; and so on. With a naturally dull sensibility to flavor, no man can easily become a good cook, or a taster of tea or wine. The third consideration is *the natural power of adhesive association* belonging to the individual character. Some minds have originally a more powerful adhesiveness than others, either for things generally, or for special departments. We see this when a number of boys come together at school, and in apprentices learning together. Some are always found taking the start of the rest in rapidity of acquirement; and although the reason may be found in some of the other circumstances now mentioned, yet observation shows that when everything else is allowed for, there remain natural differences in the rapidity with which the adhesive bond is cemented; some acquiring without effort what others take both time and labor to accomplish. The fourth principal circumstance is the *interest* taken in the work, or the degree to which it engages the feelings of the learner. This is a material consideration, accounting for the acquisitions made in matters that we have a strong taste for, without our having a pre-eminence in those other points that constitute natural capacity. These four conditions apply more or less to acquisition generally.

A detailed exemplification of this great principle of our nature might be given through all the departments of the human intellect. The acquirements of speech, as already said, contain a wide range of instances. The adhesion of language is partly in the vocal organs, partly in the ear, and partly in the eye, when we come to written and printed characters. The associations of names with things, with actions (as in obeying directions and command), and with other names (in acquiring foreign languages), are a gradual growth favored by such conditions as the above. The acquirements in science, fine art, and business, and in everything that constitutes skill or knowledge, proceed upon this plastic property of the mind. It also enlarges the sphere of our pleasures and pains. There are connections established in the mind between our states of feeling and the things that have often accompanied them, so that the accompaniment shall have power to revive the feeling. It is thus that we contract affections, both benevolent and malevolent, towards persons and things, our friends, our home, our country, our property, our pursuits.

This power of stirring up dependent associations to an extent that may be almost called unlimited (although there are limitations), is peculiar to the animal organization. Nothing parallel to it occurs in the mineral or vegetable world. It is a property of mind alone, and has its seat in the nervous tissue. We know that growth or change is

requisite to the progress of the adhesion; for it proceeds most rapidly in youth, health, and nutrition, and decays in old age, and during exhaustion and disease. And even to keep our acquisitions from fading away, it is requisite that they should be occasionally revived. A language acquired in early years may be utterly lost, by disuse. Sustained practice seems particularly necessary in early education; children's acquisitions are very liable to disintegrate, if not kept up and confirmed by new additions.

Law of Similarity.—This may be expressed as follows:

Present actions, sensations, thoughts, and emotions tend to revive their LIKE among previous impressions.

If the mind worked only by the principle of contiguity, nothing would ever occur to us except in some connection already formed. But some explanation is necessary as to the precise relationship subsisting between the two distinct forces of mental resuscitation, in order to show at once their distinctness and their connection. When the cohesive link between any two contiguous actions, sensations, or ideas is confirmed by a new occurrence or repetition, it is perfectly obvious that the present impression must revive the sum-total of the past impressions, or reinstate the whole mental condition left on the occasion immediately preceding. Thus, if I am disciplining myself in the act of drawing a round figure with my hand, any present effort must recall the state of the muscular and nervous action, or the precise bent acquired at the end of the previous effort, while that effort had to restore the condition at the end of the one preceding, and so on. But this reinstatement of a former condition by a present act of the same kind, is really and truly a case of the principle before us, or of like recalling like; and without such recall, the progressive adhesion of contiguous things would be impossible. It would appear, therefore, that similarity is tacitly assumed in the operation of contiguity, and is indispensable to the process by which our acquisitions are gradually built up. Why, then, do we set up the associating force of likeness as something independent and distinct? To answer this question we must advert to the fact that in those cases where the same impression is deepened by every new repetition, the old and the new are not merely similar, they are *identical*, and the resuscitation takes place without fail, and as a matter of course. But in going deeper into the explanation of the human intellect, we encounter many classes of similars, where there is not absolute identity, but the mixing up of a certain amount of *diversity* with the likeness actually existing. The botanist classing together all the plants of the same order, as, for example, the *rosaceae*, has to be struck with the occurrence of certain common characters—viz., the properties that distinguish the order—in the midst of great varieties in all other respects. It is important that he recognize these general marks, whether the plants be trees or shrubs, whether they be poisonous or wholesome, and under many other diversities. It is exceedingly important in science, in the business of life, and even in the creations of fine art, that the mind should take cognizance of likeness surrounded by unlikeness; which is the case that renders it necessary to characterize as distinct the associating force now under discussion. In the case of perfect identity between a present and a past impression, the past is recovered, and fused with the present, instantaneously and surely. So quick and certain is the process, that we lose sight of it altogether; we are scarcely made aware of the existence of an associating link of similarity under such circumstances. But when we pass from perfect to imperfect or partial identity, we are more readily led to perceive the existence of this link of attraction between similars, for we find that the restoration sometimes does not take place; cases occur where we fail to be struck with a similitude: the spark of resuscitation does not pass between the new impression and the old dormant one. Then it is that we recognize differences between different minds; one man tracing resemblance and making out identity better than another. Moreover, we can assign reasons connected with the culture of the individual, which partially explain superiority or inferiority in this important faculty; just as we have pointed out the conditions favorable to the rapid growth of the adhesive bond of proximity. The failure in reinstating an old impression by virtue of a present one like it, is solely ascribable to the want of perfect identity. When, in some new presentation of an object, the old familiar form is muffled, obscured, distorted, disguised, or in any way altered, it is just a chance if we recognize it; the amount of likeness still remaining will have a tendency to revive the object, while the points of difference or unlikeness will operate against the revival, and tend to restore things of their own kindred. If we hear a musical air that we are accustomed to, the new impression revives the old as a matter of course; but if the air is played with complex harmonies and accompaniments which are strange to us, it is possible that the effect of these additions may be to check our recognition of the melody; the unlike circumstances may repel the reinstatement of the old experience more strongly than the remaining likeness attracts it. If our hold of the essential character of the melody is but feeble, and if we are stunned and confounded by the new accompaniments, there is every probability that we shall not be put upon the old mental track made by the same air; in other words, we shall not identify the performance.

A few examples may next be given to show the workings of this associating power, and the consequences thence arising. The intellectual operations known under the names classification, generalization, induction, and deduction, all proceed upon the discovery of likeness among things lying wide asunder in space and time, and very often veiled by diversity. Thus, in order to include in one list all the species of the

rose, botanists have had to trace the characters of the genus through its various members, wherever they occur, and under the greatest differences in every other respect. It takes a keen identifying faculty—that is, a strong natural tendency for the resurrection of like to meet like—to see the resemblance of some of these species to the rest; and it has happened in many departments of knowledge that a class has remained incomplete for a time, purely from the disguised character of some of the individuals. So in the process termed *induction*, by which a general law is arrived at by comparing instances of it everywhere, there must be an attraction of similars, in order to bring together in the mind the collection of particulars that the induction is based upon. Thus, Newton assembled in his view the various transparent bodies that he had found in the course of his experiments to refract or bend light strongly, his only intellectual instrument for doing so being the bond of likeness operating as a power of recall. Having looked at them in company, he saw that some were remarkable for their weight or specific gravity, and others for containing inflammable ingredients; upon which he raised the general induction, connecting these two properties with high refrangibility. Then, *deductively*, he applied this generalization to the diamond, which refracts light more than any other known substance; and as it is not a heavy material, he extended the other inference to it—namely, that it was made up of some inflammable material, an inference afterwards confirmed by the discovery that it is crystallized carbon. Many of the greatest discoveries in science have turned on the identification of modes of action never before supposed the same, as when Franklin was struck with the resemblance between the atmospheric thunder and lightning and the phenomena of common electricity.

Another wide field for the operation of the same principle is the region of *illustrative comparisons*, whereby two things widely remote are brought together, in the view either to elucidate one another, or for the sake of ornament and poetic effect. Most men of genius in literature and poetry have contributed original illustrations, similes, metaphors, or comparisons in the course of their compositions. Shakespeare carries the palm in this faculty. The writings of Bacon are remarkably rich in those that serve the purpose of exposition. Science is with him the “interpretation” of nature: final causes are “vestal virgins;” they have no fruit: fallacies are “idols.” Edmund Burke, another master of illustrative comparison, has termed revolutions the “medicine” of the state, and regular government its “food.”

If we inquire into the circumstances that render one mind more prolific in new identifications and comparisons than another, apart from difference of original capacity, we must refer mainly to the fact that the one has had the greater previous familiarity with the class of things thus brought up by the attraction of similarity. A mathematician is the most likely person to bring up comparisons from mathematics; a botanist is prepared to identify plants; a traveled man provides illustrations from foreign countries; a historian, from history. The sailor is notoriously rich in nautical similes and illustrations. When any one not specially versed in a subject is yet prone to draw upon it profusely in the way of comparison, we must then refer to great natural endowment as the sole explanation. But our space does not allow us to dwell further on the subject. (For the full exemplification of both the associating principles and of the complications that they give birth to, see Bain on *The Senses and the Intellect*).

The earliest known attempt to lay down the laws whereby thought succeeds to thought, is that contained in Aristotle's treatise on memory. He enumerates three different principles of mental resuscitation—viz., similarity, contrariety, and co-adjacency. He has been followed by most other philosophers as regards all the three principles. It is now, however, clearly seen and generally admitted that contrariety is not an independent associating force. When a thing suggests its opposite or contrary, it will be found that the two have been previously together in the mind, and have therefore acquired a mutual hold by contiguity. Such, for example, is black and white, wet and dry, health and sickness, prosperity and adversity, etc. Contraries, in fact, have a natural inseparability; they are of the class of relatives like father and son, which imply each other necessarily, and have no meaning except by mutual reference. It requires no new principle of our constitution to account for suggestion in this particular case. Moreover, when things are strongly contrasted with one another, as high position before a fall, the mind is greatly impressed with the shock of transition, and so retains a lively recollection of the sequence, having by that means a greater tendency to pass from the one to the other. Thus, then, the enumeration of Aristotle is reduced to the two principles that we have now expounded.

Hobbes recognized the principle of contiguity as the foundation of reminiscence; but the Aristotelian philosopher, Vives, who wrote in the 14th c., was the first to specify in minute detail the various circumstances that determine the adhesive bond of recollection. Hume's enumeration is well known to have comprised the three principles of resemblance, contiguity, and causation, which he illustrates as follows: “A picture naturally leads our thoughts to the original [resemblance]. The mention of one apartment in a building naturally introduces an inquiry or discourse concerning the others [contiguity]. And if we think of a wound, we can scarce forbear reflecting on the pain which follows it [causation].” Causation, however, is merely a case of contiguity; so also we may say of order in place, and order in time, which have been given as distinct principles.

An attempt has been made to generalize similarity into contiguity, but without

success. For a full and critical view of the history of these laws, see Sir W. Hamilton's edition of Reid.

ASSOCIATIONS, SECRET AND BENEVOLENT. Secret Societies constitute a power separate from and independent of that which is recognized as the supreme power, hence, when organized for political purposes they are generally looked upon as disorganizing and to be feared. The opportunities and temptations which they present to the pursuit of political objects forbidden by the laws, are so great as to justify all governments in prohibiting them under whatever pretense it may be attempted to introduce them. But it may, nevertheless, have happened at particular emergencies, and during times of very imperfect civilization, that valuable service has been rendered by such combinations and they have, to a considerable extent, supplied the defects of the rude arrangements of the ordinary government. The most important of the ancient political societies was the Pythagorean (see PYTHAGORAS), which achieved perfect success, teaching wisdom and effecting a total change in the manners of the country. The Gnostics (q.v.), also, were, to a certain extent, secret associations, although religious as well as political. The Assassins (q.v.) or Ismailites, organized after the death of Mohammed, was the most powerful of all the secret associations known, since its members spread themselves all over Asia, and were a terror wherever encountered. In the latter part of the eleventh century arose the Crusaders, and from these sprung the Knights Templar (q.v.). A third great secret society of the middle ages was called the "Secret Tribunals of Westphalia," a strong organization looked upon with fear, as it held sway over the ecclesiastical and temporal. At the present time there are in the United States over 300 secret societies. This includes all the fraternal, benevolent, social, insurance, political, religious, temperance, and other orders, whose members take an obligation and hold secret sessions. Many of these are already described at length in articles under their respective titles, so it will be unnecessary to more than mention them here. The more important of these are the FREEMASONS (q.v. under MASONS), with a membership of 651,028; the ODD FELLOWS (q.v.), membership, 634,335; KNIGHTS TEMPLAR (q.v.), membership, 82,497; GOOD TEMPLARS (q.v.), membership, 484,789; GRAND ARMY OF THE REPUBLIC (q.v.), membership, 385,155; and many other smaller and less important associations, as the PATRONS OF HUSBANDRY, more commonly known as GRANGERS (q.v. under GRANGE); FENIANS (q.v.); ORANGEMEN (q.v.); KU-KLUX (q.v.); MOLLY MAGUIRES (q.v.), and MAFFIA (q.v.).

The general feeling among the Colonists preceding the war of the Revolution was antagonistic to secret societies of any kind that were particularly English in origin and character; but at the same time, a feeling grew of the need of some such organization for the purpose of attaining a higher degree of religious, social, and political freedom than was accessible through the ordinary avenues of civil life, under the existing forms of government, and efforts were made to organize societies that were truly and solely American. As a result of these efforts the RED MEN SOCIETIES founded on the customs and traditions of the North American Indians were formed about 1770, and became very popular, especially in Pennsylvania and Maryland. A reorganization took place in Baltimore in 1833, when it became known as the IMPROVED ORDER OF RED MEN, which has a present membership of 108,000. Connected with this, is the Degree of Pocahontas for women, having a membership of 11,302. Another society, truly American, formed a few years later than the Red Men was *Tammany* (q.v.). The ANCIENT ORDER OF FORESTERS was established in England in 1745. The first society of that name in America was organized in Philadelphia in 1830. The present membership in this country is 76,425. It is a purely beneficial and benevolent organization providing medical attendance and burial for members whenever necessary, and endowments for widows and orphans. A fourth degree was added in 1885, known as "Companions of Foresters," or a woman's degree of the Order. THE SONS OF TEMPERANCE is the name of a society organized in New York in 1842, with total abstinence as a basis, and it was, when organized, a sort of benefit association, but this feature has since been removed. The membership was by the last reports about 50,000. THE ANCIENT ORDER OF HIBERNIANS is a social and benevolent organization, having for its object the liberation of Ireland. It has existed in Ireland since the middle of the century. The American branch, consisting of Irish-Americans and their sons, has a membership of over 5000. The annual National Convention is held in New York on May 1st of each year. THE ORDER OF UNITED AMERICAN MECHANICS was founded in 1874. It is composed of skilled mechanics of American birth, and is both social and benevolent in its objects. Its present membership is over half a million. See also LABOR, KNIGHTS OF. For general statistics of total number of Trades Unions and their membership, see AMERICAN FEDERATION OF LABOR (q.v.). THE KNIGHTS OF PYTHIAS is the name of a body organized in Washington, D. C., in Feb., 1864, and composed exclusively of clerks of the several departments of the Government. The ritual was prepared by Robert A. Champion, but the association owes its existence to Joseph Dowdall, of Columbus, Ohio. It is in a most flourishing condition, and has a membership of over 125,000. The BENEVOLENT PROTECTIVE ORDER OF ELKS, composed principally of members of the dramatic profession, was organized in New York, Feb. 16th, 1868. The meetings are held every Sunday evening, the business meeting being followed by a social session, which includes the drinking of a toast at precisely eleven o'clock, "To our absent

brothers." There were in 1890, 198 lodges in the United States. In 1871, a charter was obtained from the State Legislature of New York for the organization of a Grand Lodge, and this now holds annual meetings in New York City. In 1878, the ELKS MUTUAL BENEFIT ASSOCIATION was formed "for the relief of the sick and the needy, and the burial of the dead," and they also purchased a large burial plot in Evergreens Cemetery, which was dedicated June 1st, 1879. See also CRISPIN, KNIGHTS of ST.

These are only a very few of the best known of these organizations at the present time. Indeed, almost every profession has one or more of these Benefit Associations, all of which render efficient aid to their members when necessary. The Mutual Benefit Insurance Companies and Associations have increased so rapidly of late years that their number is almost legion. These companies usually consist of a limited number of members, each of whom pays a fixed sum on the death of any of their number. One of the most important of these companies is the ROYAL ARCANUM. It was organized in June, 1877, in Boston, Massachusetts, and incorporated under the laws of that state. Its total membership, in 1890, was 106,207, the number of deaths had been 4772, and the total amount of benefits paid, \$13,965,528. The IRON HALL was organized in 1881, and in 1891, its total membership was 62,000, while its total disbursements had been \$5,075,537. The KNIGHTS of HONOR and the ORDER of AMERICAN WORKINGMEN are even larger.

ASSOLANT, JEAN-BAPTISTE ALFRED; b. Aubusson Creuse, France, 1827. He visited America, and on his return contributed articles to the *Revue des Deux Mondes*, which in 1858 he collected into book-form as *Scenes of Life in the United States*. He wrote a number of stories and romances, contributed to or edited many of the leading Parisian journals, and published numerous collections of his political and miscellaneous articles. He died in 1886.

ASSOUAN', **ESSUAN'**, or **ESWAM'**, the ancient Syene, a t. of upper Egypt, on the e. bank of the Nile, near the borders of Nubia, 110 m. s. of Thebes, in lat. 24° 5' 30" n., and long. 32° 55' e. There are few remains existing of the ancient city. Some granite columns present themselves among the ruins, but do not seem of an early date; and part of a temple still remains with a dilapidated portico. Of the town-wall, that part which lies to the s. of the old t. is still standing; and beyond it is the cemetery of A., where there are numerous tombs, mostly cenotaphs, with Arabic inscriptions. In the neighborhood there are several granite quarries, some of them remarkable for remains of ancient materials that had been cut from the rock, and partially hewn, and for antique inscriptions and tablets, announcing the removal of blocks and the reign of the Egyptian monarch by whose orders they had been quarried.

The ancient name Syene is the Coptic word *souan* or *suan*, signifying "opening;" and the modern one is formed by adding the Arabic *el*, "the," softened into *es*, viz., *Es-suan*, "the opening." A. and its vicinity are highly interesting to geologists and mineralogists; that kind of granite called syenite receives its name from the town.

ASSOUCY, CHARLES COYPEAU D', 1604-79; a French poet, who called himself "the emperor of burlesque," a title which others changed to "Scarron's ape." He was the author of many burlesque works, none of them especially brilliant.

ASSUMPSIT, in law, a comprehensive title for a wide class of actions. *Express A.* is an undertaking made orally or by writing not under seal, or as matter of record, to perform an act or to pay money. *Implied A.* is an undertaking presumed in law to have been made by a party, from his conduct, although he has made no express promise; on the ground that everybody is supposed to have undertaken to do what, in point of law, is just and right. In practice, A. is a form of action for the recovery of damages, for non-performance of a parole, or simple contract. A. may be distinguished also as *special* or *common*. *Special A.* includes action on written agreements, or for dereliction where a contract exists or may fairly be implied, such as professional neglect on the part of a physician, or by common carriers. *Common A.* is usually an action for satisfaction for goods sold or money lent. Non-A. is the usual plea under which the defendant may give in evidence most matters of defense.

ASSUMPTION, a town and river of Quebec, Canada. About 8 m. below the village, the river flows into the St. Lawrence, or rather into the Ottawa, nearly opposite to the lower extremity of the island of Montreal.—A., or Asuncion, is also the name of the capital of Paraguay, on the left bank of the river of that name. It has a pop. of 45,000, and has a trade in hides, tobacco, timber, wax, and Paraguay tea. The city was founded in 1535 by the Spanish, and soon became a place of importance, though not of beauty, being ill-built, dirty, and disagreeable. The surrounding country is rich in pastures, and also produces crops of wheat, maize, sugar, tobacco, honey, wax, etc. See ASUNCION.

ASSUMPTION, a parish of s.e. Louisiana, w. of the Mississippi; 335 sq. m.; pop. '90, 19,629, inclu. colored. It is one of the best sugar districts in the country, the soil being remarkably fertile. Judicial seat, Napoleonville.

ASSUMPTION OF THE VIRGIN MARY. A festival of the Rom. Cath. church. In the 7th c., the idea originated that the soul and body of the Virgin had been carried up to heaven by Christ and his angels. The Roman Catholic church, therefore, has, ever since that period, kept the 15th of Aug. in memory of Mary's translation into glory; although, from the 4th c. until then, it had kept the same day in memory of her death.

ASSURANCE. See INSURANCE.

ASSYRIA (called *Athura* on Persian cuneiform inscriptions, and *Assura* on the Median) was the northernmost of the three great countries that occupied the Mesopotamian plain. It was bounded on the n. by the Niphates mountains of Armenia; on the s. by Susiana and Babylonia; on the e. by Media; and on the w., according to some, by the Tigris, but more correctly by the water-shed of the Euphrates, for many Assyrian ruins are found to the w. of the Tigris. It was thus about 280 m. long from n. to s., and rather more than 150 broad from e. to w. This plain is diversified by mountain-chains on the n. and e., and watered by the Tigris and its affluents, between two of which—the Zab rivers—lay the finest part of the country, called *Adiabéné*. As it was the boundary-land between the Semitic people and Iran, it became the scene of important political events. Its extraordinary fertility enabled it to support a large population. The high degree of prosperity and civilization reached by its inhabitants in very early times is attested not only by ancient writers, but by the extensive ruins of mighty cities, by the canals and contrivances for irrigation, and by the many proofs—furnished by recent excavations—of an acquaintance with the arts and sciences. The ruins of many cities are grouped around Nineveh; while lower down, the Tigris exhibits an almost unbroken line of ruins from Tekrit to Bagdad. Under the Mohammedans, this fine country is now almost a desert.

History.—Ancient authorities differ widely from each other respecting the rise and progress, the extent and the duration, of the Assyrian empire. Ctesias, a Greek of *Onidus*, court-physician to *Artaxerxes Mnemon*, is quoted by various ancient writers; and his information, though utterly incredible and fabulous, has been followed by most classical historians, and by the whole series of ecclesiastical writers. Many ingenious but futile attempts have been made to reconcile his history with the Scripture narrative. *Berosus*, a priest of *Bel* at *Babylon*, who wrote about 268 B.C., and *Herodotus*, differ widely from Ctesias, but are confirmed in many important particulars by the Bible, and by the continually increasing evidence derived from cuneiform inscriptions.

In the Bible narrative, we are told that *Nineveh* was founded by *Ashur* from *Babylon* (*Gen.* x. 11). The latter city, therefore, must have been the capital of a more ancient empire, as *Berosus* asserts, and recent discoveries go far to prove, though Greek writers maintain the reverse. The next notice we have of A. does not occur till 770 B.C., when *Pul*, king of A., invaded Palestine, but was bought off by *Menahem*, king of *Israel*. *Tiglath-pileser*, who succeeded *Pul* (738 B.C.), conquered Syria, and carried off many of the Jews into captivity. Next, *Salmaneser* (730 B.C.) subdued *Israel*, which, at the instigation of the Egyptians, had refused to pay tribute. The next is *Sennacherib* (713 B.C.), who attacked Egypt, and threatened Judah under *Hezekiah*. He was slain by his two sons, and succeeded by his son *Esarhaddon*, who was also master of *Babylon* (2 Chron. xxxiii. 11), which, under *Nabonassar*, had been independent of *Nineveh* since 747 B.C. Very little credit is to be attached to the expedition of *Holofernes* recorded in the book of *Judith*.

After this, the empire appears to have gradually decayed, until at last, in the reign of *Sardanapalus II.*, or *Saracus*, a league was formed for its destruction between *Nabopolassar*, governor of *Babylon*, and *Cyaxares*, king of *Media*, which was strengthened by the marriage of *Nebuchadnezzar*, son of the former, to *Nitocris*, daughter of the latter. The war and siege are said to have been interrupted by an invasion of the Scythians, which drew off *Cyaxares*; but at length *Nineveh* was taken and destroyed about 606 B.C., or, according to *Rawlinson*, 625. In the time of *Darius Hystaspes*, A. rebelled without success in conjunction with *Media*. In the time of *Herodotus*, the capital had ceased to exist; and when *Xenophon* passed it, the very name was forgot, though he testifies to the extent of the deserted city, and asserts the height of the ruined walls to be 150 ft. An inconsiderable town seems to have existed on its ruins in the reign of *Claudius*; and the last notice we have of *Nineveh* in the classics is in *Tacitus*.

According to the Greek legends, the Assyrian empire was founded by *Ninus*. To this monarch and his consort *Semiramis* are ascribed expeditions on an incredibly magnificent scale against *Bactria*, *Ethiopia*, and *India*. We are told that *Semiramis* led an army of 3,000,000 infantry, 500,000 cavalry, and 100,000 chariots, and a fleet of 2000 ships, and was encountered by forces more numerous still, and defeated; that she returned to *Nineveh*, where she soon afterwards died, and was reckoned among the gods, and was succeeded by her son, *Ninyas*, an effeminate prince. The succeeding part of the history as related by Ctesias is equally false, though that writer managed to make the ancient world give credit to his narrative in preference to that of *Herodotus*. He gives a list of monarchs from *Ninus* to *Sardanapalus*, which is now considered to be a clumsy forgery. According to him, for 30 generations after *Ninyas*, the kings led a life of luxury and indolence in their palace; the last of them, *Sardanapalus*, made a vigorous defense against *Arbaces*, the rebel governor of *Media*, but finding it impossible to defend *Nineveh*, he set fire to his palace, and burnt himself with all his treasures; this event took place 1306 years after *Ninus*. Now, the above account represents *Nineveh* to have perished nearly three centuries before the real date, which was about 605 B.C., and is utterly incompatible with Scripture. *Herodotus* assigns to the empire a duration of 520 years, and *Berosus* of 526 years. In order to reconcile these conflicting accounts, historians have supposed that *Nineveh* was twice destroyed, but this supposition is now generally rejected. However, that *Nineveh* was actually destroyed by fire is proved from the

condition of the slabs and statues found in its ruins, which show the action of intense heat.

A. became a Median province, 605 B.C., and afterwards, in conjunction with Babylonia, formed one of the satrapies of the Persian empire. In 331 B.C., at Gaugamela, near Arbela, in A., Alexander defeated Darius Codomannus. In 312 B.C., A. became part of the kingdom of the Seleucidae, whose capital was Seleucia, on the Tigris. It was afterwards subject to the Parthian kings, whose capital was Ctesiphon, and was more than once temporarily in possession of the Romans. When the Persian monarchy of the Sassanides was destroyed by the successors of Mohammed, A. was subject to the caliphs. Their seat was Bagdad from 762 A.D. till 1258. It has been under the Turks from 1638, at which period it was wrested from the Persians.

We shall now proceed to mention a few historical points that have been satisfactorily ascertained from the cuneiform inscriptions. For these we are indebted to Rawlinson's *Herodotus*.

It has not been ascertained when A. first became independent of Babylon (q.v.). The seat of government was first at Asshur (now *Kileh-Shergat*), on the right bank of the Tigris, 60 m. s. of the later capital, Nineveh. At this place have been found the bricks and fragments of vases bearing the names of the earliest known Assyrian kings, for Ninus and Semiramis are to be considered as mere inventions of Greek writers. The earliest known king is *Bel-lush*, one of a series of four. These reigns probably occupy from 1273 to 1200 B.C. Of the next series of six, the names of five are recorded on the famous Kileh-Shergat cylinder, the earliest purely historical document as yet discovered in Mesopotamia.

Tiglath-nin, the last of the Kileh-Shergat series, was succeeded by his son, Asshur-dani-pal, the warlike Sardanapalus I. of the Greeks. He made Calah, the modern *Nimrud*, his capital, lying 40 m. further n., on the left bank of the Tigris. His annals are very complete. Among other conquests, he mentions that he had taken tribute from Tyre, Sidon, and other Phœnician cities. He was the founder of the n.w. palace at Nimrud, which, next to that of Sennacherib at Koyunjik, is the largest and most magnificent of all the Assyrian edifices. The greater portion of the sculptures now in the British museum is from this building.

Sardanapalus I. was succeeded by his son Shalmanubar, whose deeds are briefly recorded on the black obelisk now in the British museum, the full account being apparently reserved for the colossal bulls, which seem to have been the usual dedication after a victory. Of his campaigns, the most interesting to us are those in which he defeated Benhadad of Damascus, and his murderer and successor Hazael. According to his own account, Shalmanubar defeated Hazael, killing 16,000 of his fighting-men, and capturing more than 1100 chariots (884 B.C.). The obelisk also records the tribute paid by *Yahua, son of Khumri*, i.e., Jehu, son of Omri, king of Israel. Now Jehu was son of Jehoshaphat, and had done his utmost to extirpate the family of Omri; but probably Jehu, like other usurpers, was anxious to identify himself with the family which he had dispossessed, and of course the Assyrians accepted the title he gave himself.

Iva-lush, probably the Pul of the Scriptures, is recorded on a pavement-slab from Nimrud to have received tribute from Samaria, Tyre, Damascus, Idumæa, and Palestine, which assertion agrees with the account given (2 Kings xv.) of the 1000 talents paid by Menahem. With this king ends the first dynasty, in which we have 18 monarchs from Bel-lush to Iva-lush (1273-747 B.C.).

The later Assyrian empire begins with Tiglath-pileser II. (747 B.C.), and ends with the destruction of Nineveh (625 B.C.). It is plain from Scripture that the empire was in a flourishing condition during the reigns of those kings who came in contact with the Hebrews, and this account exactly accords with the monuments, but contradicts Herodotus. Probably, on the accession of Tiglath-pileser II., Babylon had revolted, and this partial rebellion had reached Herodotus in an exaggerated form. The annals of this prince exist only in a very fragmentary state. The name of his successor, Shalmaneser, has not yet been found on the monuments. The capture of Samaria is usually ascribed to this prince, but his successor, Sargon, expressly asserts that Samaria was taken by himself in his first year. Sargon's palace at *Khorsabad*, near Nineveh, furnished the valuable series of monuments now in the Louvre. Sargon was succeeded by his son Sennacherib. He fixed the seat of government at Nineveh, and employed the forced labor of 360,000 men to repair the great palace. Later in his reign, he built a new and more magnificent edifice, which he decorated with sculptures representing his various exploits. This is the palace excavated by Layard. It contained at least three spacious halls—one of them 150 ft. by 125, and two long galleries, one of 200, the other of 185 ft., besides innumerable chambers. The excavated portion covers above 8 acres. The annals of Sennacherib extend only to his eighth year. He relates at length his successful attack upon Babylon, his invasion of Judea, the submission of Hezekiah, and his deportation of 200,000 Jews. This expedition is not to be confounded with the second invasion, in which he failed ignominiously, and which is not recorded on his monuments. His assassination very shortly after his return to Nineveh, after his second expedition, readily accounts for this silence.

Esarhaddon, his son and successor, held his court sometimes at Nineveh, sometimes at Babylon. Bricks bearing his name have been discovered at *Hillah*, and a tablet at Babylon dated in his reign. This explains how Manasseh was brought to him at Babylon, when he was led captive from Jerusalem (2 Chron. xxxiii.). No record has as yet been discovered of this expedition against Palestine. His edifices are not inferior to those of his predecessors. He employed Greek and Phœnician artists, and to them, probably, we owe the beautiful bas-reliefs that adorn the edifices of his erection. The decline of the empire probably commenced with Asshur-bani-pal II. The arts of peace flourished, while the military vigor of the nation declined. The sculptures of this reign are decidedly superior to the earlier in spirit, delicacy, and freedom from conventionality. The slabs show that hunting, not war, was this king's favorite pursuit. He was succeeded by his son Asshur-emit-ili, the last king of whom any records have yet been discovered. It is uncertain whether Nineveh was destroyed under him, or under a successor, the Saracus of Berosus, the effeminate Sardanapalus of the Greeks. The character usually given of this last king, as a debauchee throwing off his indolent habits, and after performing prodigies of valor, perishing by a glorious death, rather than surrender, is derived solely from Ctesias. All we distinctly know is that, finding him self betrayed to the Median king by Nabopolassar, governor of Babylon, he set fire to his palace and perished in the flames.

We may here note a singularly important cuneiform discovery made by Mr. George Smith, of the British museum, and the substance of which was made public at a meeting of the Biblical archæological society in Dec., 1872. While engaged on an examination of the collection of Assyrian tablets in the British museum, Mr. Smith lighted upon a curious series of legends, including a copy of the story of the flood. On discovering these documents, which were much mutilated, he searched over all the collections of fragments of inscriptions, consisting of several thousands of smaller pieces, and ultimately recovered 80 fragments of these legends. The tablets were originally at least 12 in number, forming one story or set of legends, the account of the flood being on the 11th tablet. Of the inscription describing the flood, there are fragments of three copies, containing duplicate texts. These texts belong to the time of Asshur-bani-pal (*circa* 660 B.C.), and were found in the library of that monarch in the palace of Nineveh. The original text, according to the statements on the tablets, belonged to the city of Erech, and appears to have been either written in or translated into the Semitic Babylonian at a very early period. Mr. Smith is of opinion that its composition cannot be placed later than the 17th c. B.C., while it may be much older. The Assyrian story of the deluge is both like and unlike the Scripture narrative. The flood is sent as a punishment for sin; the builder of the ark is called Sisit (the *Xisuthrus* of the Græco-Chaldæan Berosus); he gathers into the vessel all his male and female servants, all the sons of the army, and all the beasts of the field; the storm of rain lasts only six days, and yet submerges the whole earth; all life is destroyed; Sisit sends forth a dove which can find no resting-place, and returns; then a swallow, which is also forced to return; then a raven, which does not come back. The ark rests on a mountain, the animals are liberated, an altar is built by the grateful patriarch, and Bel, the great god, makes a "covenant" with Sisit. The minutest details of this Assyrian legend diverge greatly from the Hebrew account, and lead to the conclusion that in each we have an independent tradition of some great natural catastrophe in the early ages of human history. Mr. Smith notices that the Biblical narrative is the version of an inland people; the name of the ark in Genesis means a chest or box, and not a ship; there is no notice of the sea or of launching, no pilots are spoken of, no navigation is mentioned. The inscription, on the other hand, belongs to a maritime people; the ark is called a ship, the ship is launched into the sea, trial is made of it, and it is given in charge to a pilot. This seems to point to the Persian gulf as the birthplace of the old legend. Mr. Smith returned in 1874 from Chaldæa, and gave an account of his valuable discoveries in a work entitled *Assyrian Discoveries* (1875). Believing that many more legends and histories lay beneath the ruins of the ancient cities of Chaldæa, he was on his way to prosecute his third exploration, when he succumbed to the hardships and privations of the task, and died at Aleppo in August, 1876.

Government.—The government was despotic, as suited the character of the people. The empire was a mere congeries of kingdoms bound to the supreme authority only by certain obligations of paying tribute, giving presents, and showing due respect. Each kingdom retained its own rulers, laws, and religion, although we do find some attempts to rule by satraps and collectors of tribute. Tiglath-pileser also boasts, in an inscription, of having punished and crucified the Chaldæans who refused to worship his gods. In consequence of this imperfect organization, the empire was exposed to frequent revolts of the subject nations, when such opportunities offered as a disputed succession, or want of energy in the ruling prince. Then the labor of conquest had to begin anew, and it was sought to diminish the danger of the central power by inflicting severe punishments on the rebels. The history of the Jews has made us familiar with one of these devices—viz., the wholesale deportation of the inhabitants of the offending district. It may be readily believed that such an empire, though imposing from the magnificence and wealth of the capital, yet, from the impoverishment and weakness of the subject states, was continually liable to fall to pieces, and was ill fitted to resist an attack from

without. That A. did actually last for five centuries, was owing to a long succession of warlike princes, and to the energy of the population.

Religion.—The religion of the Assyrians was nearly identical with that of the Babylonians. It was a gross polytheism, their gods being thousands in number, and each village having its own particular deity. From thousands of theological tablets now in the British museum, it is known that each divinity had many names, and some of them as many as fifty titles besides. Again, many deities that are prominent in the Babylonian pantheon are either unknown or occupy a subordinate position in the Assyrian. Besides, the same gods did not remain equally popular throughout. The supreme god was Asshur, probably the deified patriarch. His worship was confined to Assyria. He is generally associated in the inscriptions with *Nin* and *Nergal* (2 Kings xvii. 30), who are represented by the man-bull and the man-lion. The winged globe, so often seen in the sculptures, from which a figure with a horned helmet shoots his arrows, is supposed to be the emblem of Asshur. Next in rank is the governing triad, answering to the Pluto, Jupiter, and Neptune of the classical mythology; the next group corresponds to Æther, the sun and the moon; then five inferior deities, representing the five planets. Each god is associated with a goddess. Mylitta, or Beltis, is the "queen." The male and female powers of the sun are represented in the Scripture phrase, "Adrammelech and Anamelech, gods of Sepharvaim"—that is, of Sippara, a town a few miles above Babylon. *Bel-merodach* was originally an inferior deity, son of Héa, the fish-god; but, under the later Babylonians, we find him monopolizing the greater part of the homage which used previously to be divided among several. Nisroch (2 Kings xix. 37) has not been yet ascertained. Nebo (Isaiah xli.) is one of the five planetary gods, and corresponds to Mercury. The systems of notation, divisions of time, the planets and stars, animals and metals, divination and astrology, were all more or less closely connected with theology.

Ethnology.—The Assyrians have been assigned by some ethnologists to the Aryan race, but it is now generally acknowledged that they were a branch of the Semitic family of nations, and therefore were members of the same grand division of the human race as the Syrians, the Phœnicians with their colonies, the Jews, and the modern Arabians. In the 20th c. B.C., Semitism, as a distinct ethnic element, appears to have first developed itself. The original races, variously called Scythic, Turanian, or Tartar, appear to have once been spread over the whole space from the Caucasus to the Indian ocean, and from the Mediterranean to the mouths of the Ganges. Their type of language has continued to our time to exist in four fifths of Asia, and in some of the remotest corners of Europe, as among the Finns, Lapps, Turks, and Hungarians. In Mesopotamia, and in the valley of the Nile, where natural advantages induced men early to form settled communities, the rude and inartificial type of language was developed into Hamitism, and afterwards still further improved into Semitism. Then seems to have commenced a series of migrations. Asshur went forth probably at this time from Babylon to A., Abraham and his followers to Palestine, the Joktanian Arabs to Arabia. From these seats, Semitism was afterwards carried to Cyprus, to the southern seaboard countries of Asia Minor, to Carthage, Sicily, Spain, and western Africa.

The traditions of A. indicate a very early connection between Ethiopia, Arabia, and the cities on the Euphrates. Mesopotamia undoubtedly contained a large proportion of Arabians, and this accounts for the fact that Herodotus styles Sennacherib king of the Arabians and Assyrians. The Chaldeans, colonies of whom were planted in Armenia by the Assyrian kings, are supposed by some to have been a foreign tribe, which had emigrated from the north, and become a priestly caste. But the *Akkad* race, of which the Chaldean is a tribe, is with more probability thought to have inhabited Babylonia from the remotest times, and by it the earliest civilization in Mesopotamia was originated. Probably the art of picture-writing was possessed by the Hamitic tribes who lived in the valley of the Nile, and passed eastward to the Euphrates. The *Akkad* language appears to have been formed before Semitism attained its peculiar development and organization. Long after Semitism had become predominant in Mesopotamia, the *Akkad* or Chaldean alphabet continued to be the scientific language in which all the tablets relating to mythology, astronomy, or science, as well as most historical and official records, were written. This alphabet was adopted with certain modifications by the Semitic tribes, which became predominant in Assyria. The cuneiform characters were elaborated from forms of natural objects, and gradually became phonetic from being symbolic, and for convenience of engraving, assumed the form of arrow-heads, instead of the rounded and flowing forms which are introduced by the use of plastic materials. After the Aryan race had spread more extensively in western Asia, the Persian monarchs, when they wished to make any communication to their subjects generally intelligible, found it necessary to publish it in three languages belonging to the principal divisions of human speech; hence the trilingual inscriptions of Behistun, etc., which consist of an Indo-European, a Tartar, and a Semitic column. It is still necessary in many places to employ three tongues, representatives of the three families, Persian, Turkish, and Arabic.—See Lenormant, *La Langue Primitive de la Chaldée*.

Antiquities, Civilization, etc.—The excavations carried on by M. Botta, French consul at Mosul, and by Layard near Mosul, Khorsabad, and Koyunjik, have led, as we have partly seen, to very interesting discoveries. The palaces and buildings that have been

laid open are full of sculptures, all covered with inscriptions, in deciphering which considerable progress has been made, and more may be expected. Among the most remarkable monuments now in the British museum are two winged, human-headed lions, 12 ft. high, and as many in length; winged human-headed bulls of similar dimensions with the lions; winged sphinxes; and the famous obelisk of black marble, sculptured on the four sides. On this last are represented a victory, a prisoner prostrate at the feet of the king, and foreign people offering tribute, and leading such animals as the Bactrian camel, elephant, lion, and rhinoceros—animals found only in lands far east of the Tigris. The bas-reliefs are very numerous, exhibiting especially war and hunting. The march, the onset, the pursuit, the siege, the passage of rivers, the submission and treatment of captives, secretaries noting the number of heads taken in battle, and the amount of spoil; the chase of the lion, of the antelope, of the wild ass, and other animals—such are the favorite subjects of the Assyrian sculptor. Nor are they treated in the conventional style of Egypt, but in a manner which, for grace, spirit, correctness, and delicacy of execution, excels everything else known in Asiatic art. The artists sometimes follow modes of representation different from ours; for instance, a bull has five legs given him, in order that from all points of view he may be seen with four; a ladder stands edgewise against a wall, to show it is not a pole. But a truthful impression is always aimed at, and it is this that gives these sculptures their value. The labor bestowed on the careful finish of a priest's dress, and in the tasteful decoration of an article of furniture, proves them to be the work of an ingenious and painstaking people. From the bas-reliefs we gain but little information respecting the private life of the Assyrians. There are a few which represent the foddering of cattle, women riding on mules, etc.

It is natural to expect that Nineveh—a wealthy and luxurious city—imported many of the products of other countries, yet the manufactured goods would mainly be of home production. The jars, bronzes, glass bottles, carved ornaments in ivory and mother-of-pearl, engraved gems, bells, earrings, arms, utensils, are of excellent workmanship. The ornaments especially are in good taste, and evince no inconsiderable skill in the working of metals. Transparent glass was not unknown, nor the use of the lens as a magnifying agent. The Assyrians knew the principle of the arch, the use of the lever and roller, and the construction of aqueducts and drains. In the arts of peace, they appear to have been not inferior to any ancient nation; while their conquests, and the long duration of their empire, suffice to prove their capacity for war.—See Rawlinson's *Five Great Monarchies of the Ancient World, Chaldaea, Assyria, Babylonia, Media, and Persia*; and Mr. George Smith's *Assyrian Discoveries* (1875), and his *Babylonia* (new ed., by Sayce), and Sayce's *Assyria* (1885). See illus., NINEVEH AND ASSYRIA, vol. X., p. 654.

AST, GEORGE ANTON FRIEDRICH, 1778-1841; a German philologist. He was professor of classical literature at Landshut, and at Munich in 1826. Among his works are a *Manual of Aesthetics, Life and Writings of Plato*, and an edition of Plato.

ASTACUS. See CRAYFISH and LOBSTER.

ASTAR'TÉ (styled Ashtaroth in the Old Testament), the name of the chief female deity of the Phœnicians, Carthaginians, and Syrians (Syria Dea), also worshiped by the Jews in times when idolatry prevailed. A. was the original from which the Greeks borrowed their Aphrodite (q.v.). As Baal was god of the sun, A. was goddess of the moon. Her chief temples were in Tyre and Sidon. According to ancient accounts, her worship was of a licentious character. The oldest known image of her—that in Paphos—represented her simply under the form of a white conical stone. In Canaan and Phœnicia she was subsequently typified under the form of a cow, or sometimes she had only a cow's or bull's head; still later, her emblem became a star; and finally, she was conceived of as the "queen of heaven," sitting on a lion, her head surrounded with rays, and in the one hand a thunderbolt, in the other a scepter. See illus., NINEVEH AND ASSYRIA, vol. X., fig. 7.

ASTAR'TE, a genus of mollusca, with bivalve shells, the type of a family *astartidæ*, very closely allied to the *veneridæ* or Venus family. It is interesting chiefly with reference to geologic changes and the history of life and organization, because only a few species seem now to exist, and these limited to the north Atlantic and Arctic oceans, whereas the fossil species are extremely numerous, commencing with the *lias* period, and distributed over the whole world. The *astartidæ* may be regarded as having given place to the *veneridæ*, which commenced with the oolitic period, and are among the most abundant bivalve mollusca of the present time.

ASTATIC NEEDLE, a magnetic needle for which the influence of the earth's magnetism has been evaded or neutralized. A needle would become A. if it were placed with its axis vertical at the magnetic pole, and it would point indifferently to any part of the horizon. A needle is usually made A. by fastening below it to the same axis a second needle of equal directive force, having its poles reversed. The influence of the earth's magnetism on the two needles, being equal and opposite, is neutralized, and the pair is then free to respond to any other magnetic influence which may be presented to it. The A. N. is an important part of most galvanometers.

A-STAY', the position of an anchor when, during heaving, the cable forms an angle with the surface of the water in line with the stays of the ship.

ASTER (Gr. a star, from the form of the flowers), a genus of plants of the natural order *compositæ*, which Lindley has therefore chosen to call *asteraceæ*. The ray and the disk are of different colors. The genus contains a great number of species, both herbaceous and shrubby, which have been arranged into six or seven groups, regarded by many as distinct genera. One species only, *A. tripolium* or *tripolium vulgare*, the sea starwort, is a native of Britain. It is common in salt marshes. A number of perennial species are in cultivation as garden flowers, of which the New England A. (*A. novæ anglia*) and the Michaelmas daisy (*A. tradescanti*), both natives of North America, are perhaps the most common, and, with some of the other species, are prized as among the comparatively few flowers to be seen at that dull season when autumn is giving place to winter. But the best known and most valued of all the asters is the China A. (*A. chinensis*), a summer annual, of which many varieties are in cultivation, and new ones are continually introduced. It was brought from China in the earlier part of the 18th century. The varieties exhibit great diversities of form and color. The plant delights in a rich free soil. In the northern parts of Britain, the seed is generally sown in April in a hot-bed, or in pots under a frame, and the young asters are planted out in the open air in May. They flower from July to the end of autumn, and contribute much to the liveliness of the flower-garden.—*A. argophyllus*, or *hætonia argophylla*, is a shrub, a native of Van Diemen's land, smelling strongly of musk. The whole plant has a whitish aspect. It grows to a considerable size, but succeeds in the open air only in the very south of England.

ASTER, ERNEST LUDWIG VON, 1778–1855; an engineer; a lieutenant in the army of Saxony in 1800, and captain in 1809. Napoleon took an interest in his plan for the fortification of Torgau and adopted it, employing A. to superintend the work. A. soon after went into the service of Russia, took the command of a Cossack force, and fought at Bautzen and Leipsic. Returning to Saxon service in 1813, he became a colonel; two years later, in the Prussian engineer corps, he was engaged at Ligny and Waterloo. After the last battle he was promoted to be general, and made inspector of Prussian fortifications, winning a world-wide reputation in the construction of the defenses of Coblenz and Ehrenbreitstein. He was made commander of both fortresses; in 1827, lieutenant-general; in 1842, general of infantry. Ten years afterwards he was made a councilor of state. He left essays and other works posthumously published.

ASTERABAD. See **ASTRABAD**.

ASTERIAS AND **ASTERIADÆ**. See **STARFISH**.

ASTERISK (Gr. a little star), a sign or symbol (*), used in writing and printing either as a reference to a note at the bottom or on the margin of the page. The obelisk or dagger (†), and many other marks, are similarly employed; but when there are several references on the same page, it is now common to use the numerals 1, 2, 3, etc. The A. and other similar signs may have any arbitrary meaning assigned to them, at the will of the writer, an explanation being previously given what the signification is to be. The Greek grammarians, or critics, used the A. to mark a passage that had been unjustly suspected, but was to be held as genuine, or a passage in any way remarkable; the obelisk, again, marked an interpolated or an objectionable word or passage.

ASTEROIDS. See **PLANETONDS**.

ASTEROPHYLLITES (Gr. *aster*, a star, and *phyllon*, a leaf), a generic name, under which are included many of the most abundant fossil plants of the coal-measures. The leaves are arranged in a stellated manner around the stems or branches. The A. are ranked among the exogenous or dicotyledonous fossils, but they are of doubtful affinity. See *illus.*, **COAL AND ROCK SALT**, vol. IV.

ASTHMA is a disease characterized by the breathing, previously natural, becoming difficult, and accompanied by wheezing and a distressing sense of tightness in the chest. A. generally appears at first after some inflammatory affection of the respiratory mucous membrane, and more especially in those who have led dissipated lives. In others, it is clearly hereditary, and frequently affects several members of the same family. A. may be habitual, or may occur in spasms, generally preceded by some premonitory symptoms, as in some by great drowsiness; others, says Dr. Hyde Salter, "know by extreme wakefulness and unusual mental activity and buoyancy of spirits; and I knew one case in which an attack of ophthalmia occurred."

The spasms may occur at any hour; but in nineteen out of twenty cases they awaken the patient from sleep between three and four in the morning. The horizontal position facilitating the flow of blood to the right side of the heart, and therefore to the lungs, the disadvantage at which the muscles of respiration are placed, and the greater readiness with which sources of irritation act during sleep, explain this fact.

Persons subject to A. scarcely dare fall asleep after any imprudence in diet; if they continue awake till their supper is fairly digested, and the stomach empty, they may go to sleep fearlessly, and have a good night's rest. The asthmatic paroxysm is thus described by Dr. Salter, the latest authority on this common but terrible disease: "The patient goes to bed and sleeps two or three hours, becomes distressed in his breathing, and begins to wheeze, so as to waken those in adjoining rooms. He awakes, changes his position, falls asleep again and again, and the miserable fight between A. and sleep may go on, till the increased suffering does not allow the patient longer to forget him-

self for a moment; he becomes wide awake, sits up in bed, throws himself forward, plants his elbows on his knees, and with fixed head and elevated shoulders, labors for breath like a dying man."

If the spasm is protracted, the oxygenation of his blood is imperfectly performed, owing to the scanty supply of air, and his extremities get cold and blue, but at the same time the violent muscular efforts at respiration cover him with sweat. The pulse is always small. The muscles of the back and neck attached to the ribs, act as extraordinary muscles of respiration. The chest enlarges during the paroxysm, but in it there is almost perfect stagnation of air. The respiratory tubes affected are very small, and the parts at which they are so constricted are constantly shifting.

The remedies for A. are numerous, but not to be depended on. They consist in paying attention to the digestive system, and in anti-spasmodics, either taken internally or by inhalation.

ASTI (*Asta Pompeia*), a city of Piedmont, in the government of Alessandria, lies on the left bank of the Tanaro, on the railway from Turin to Genoa, 26½ m. e.s.e. of Turin. Pop. about 17,000. It is a large town, with walls considerably dilapidated, and the streets generally very narrow and irregular. It is the seat of a bishop, and has a court of justice and a royal college. There is carried on a considerable trade in silk and woolen fabrics, leather, and hats, as well as in wines and agricultural produce. A. is a town of high antiquity, having been famous for its pottery before its capture by the Gauls in 400 B.C. On the occasion of its being again taken and destroyed in an irruption of the Gauls, it was rebuilt by Pompey, and received the name of Asta Pompeia. In the middle ages, A. was one of the most powerful republics of upper Italy. It was captured and burnt by the Emperor Frederick I. in 1155; and after a series of vicissitudes, it came into the possession of the Visconti of Naples, by whom it was ceded to the French, in whose hands it remained till the middle of the 16th c., when it came into the possession of the dukes of Savoy, as it still remains. Alfieri was born here, 1749.—The district of Asti, one of the six subdivisions of the government of Alessandria, is bounded on the w. and n. by the province of Turin, s. by Alba, s.e. by Alessandria proper, and n.e. by the province of Casale. The surface is hilly and picturesque. The soil rests upon limestone abounding in fossils, and is fertile, producing corn, fruit, and wine. It is celebrated for a fine white wine resembling champagne, called *vino d'Asti*. Silk is one of its most important products.

ASTIGMATISM, a defect in vision caused by the refraction of light by the eye differently in different planes. To an eye thus affected a pinhole in a paper may appear round, but when the paper is moved a little, the circular hole will seem to be an ellipse, and by further removal it will show like a straight slit. A cylindrical or spherico-cylindrical lens will correct this defect in the sight. See EYE, DISEASES OF THE.

ASTLEY, PHILIP, 1742-1814; an English equestrian, learning the art of riding by seven years' service in the cavalry. He established the first circus in London, and there and in Dublin and Paris, with Antoine Franconi, put up nearly 20 theatres or places for equestrian display. He wrote *Astley's System of Equestrian Education*, and two small works on military matters.

ASTOLPHUS, or **ASTULPHUS**, a Lombard king succeeding Rachis, in 749 A.D. He seized upon Ravenna and threatened Rome, but, on petition of pope Stephen II., Pepin of France in 754 crossed the Alps and defeated A., who obtained peace only after surrendering all his conquests. As soon as the French king departed, A. again menaced Rome, and again Pepin came to the help of the pope, shutting A. up in Pavia. While preparing for a new campaign, A. fell from his horse, and died three days later. He left no male heirs.

ASTON, LUISE, a German authoress of some note, but principally known for her zeal in behalf of the "rights of women." She was b. about 1820, in the vicinity of Halberstadt, and at an early age was married to a wealthy English manufacturer. Their union was not happy; perhaps her peculiar views of society and of the proper position of her sex contributed to the estrangement of their sympathies. After separating from her husband, she attracted public attention, especially in Berlin, by appearing on the streets in man's dress, smoking cigars, etc. This conduct brought her into several collisions with the police, and she was twice forced to leave the city. During the Slesvig-Holstein war, however, she found a nobler sphere for her woman's nature, and displayed the greatest heroism and self-sacrificing devotion as an hospital nurse. She has written various books; the principal are *Wild Roses* (1846) and *Frieschärler-Reminiscenzen* (1849), each of which contains 12 lyrical poems, none very able; *Meine Emancipation, Verweisung, und Rechtfertigung* (1846); a novel, *Aus dem Leben einer Frau* (1847); *Revolution und Contre revolution* (1849). In 1851, she married Dr. Meier of Bremen.

ASTOR, JOHN JACOB, an enterprising merchant, founder of the "American Fur Company," was b. in a village near Heidelberg, in Germany, 1763. After spending some years in London, he sailed to America in 1783, and soon invested his small capital in furs. By economy and industry, he so increased his means that after six years he had acquired a fortune of \$200,000. Although the increasing influence of the English fur companies in North America was unfavorable to his plans, he now ventured to fit out

two expeditions to the Oregon territory—one by land, and one by sea—the purpose of which was to open up a regular commercial intercourse with the natives. After many mishaps, his object was achieved in 1811, and the fur-trading station of Astoria (q.v.) was established; but the war of 1812 stopped its prosperity for a time. From this period A.'s commercial connections extended over the entire globe, and his ships were found in every sea. He d. in 1848, leaving property amounting to \$30,000,000. He left a legacy of \$350,000 for the establishment of a public library in New York. (See Washington Irving's *Astoria*.)—His wealth was mainly inherited by his son WILLIAM, who continued to augment it till his death in 1875, when he is said to have left \$50,000,000. He added \$200,000 to his father's bequest for a public library. He was known as the "landlord of New York" from the extent of his property in that city.

ASTOR, WILLIAM WALDORF; b. Bennington, Vt., 1848, son of John Jacob Astor. He studied law in order to qualify himself for assuming the management of the Astor estate, but never practised. He was elected to the N. Y. state assembly, 1877, and to the senate, 1879; was defeated as a candidate for congress, 1881; was appointed minister to Italy, 1882, a position he held till Mar. 1, 1885. His father's death in 1890 made him the head of the family, and the inheritor of an estate estimated at \$200,000,000. He published the romances *Valentino* (1885) and *Sforza* (1889), purchased the *Pall Mall Gazette* (1892), and founded the *Pall Mall Magazine* (1893).

ASTORGA, EMANUELE D', a musician, celebrated partly on account of his personal history, was b. in Sicily in 1680. His father, a baron of Sicily, in the contest respecting the annexation of the island to Spain, was delivered over to the enemy by his own mercenary soldiers, and was executed in 1701; while his wife and son (Emanuele) were barbarously compelled to witness the tragedy. The wife died on the spot, and the son fell into a state of unconsciousness. Afterwards, through the interest of the Spanish princess Ursini, he was educated in a monastery at Astorga in Leon, from which he derived his name. Here he especially devoted himself to music, and made such progress that he was invited to the court of the duke of Parma. His patron, erroneously suspecting that his daughter was receiving his addresses, sent him away to the court of the emperor Leopold. After Leopold's death, A. traveled through Europe, and is supposed to have d. in a Bohemian monastery. His best work is the *Stabat Mater*, a masterly composition, of which the original score is preserved in Oxford.

ASTORIA, formerly a large village in Queens co., N. Y., now incorporated in Long Island city (q.v.). It is at the junction of the East river and the sound, opposite Hellgate, and was for many years a favorite summer residence for New Yorkers.

ASTORIA, city and co. seat of Clatsop co., Ore., on the s. bank of the Columbia River, about 8 m. from its mouth. It was founded as a fur-trading station in 1811, and named after the chief proprietor, John Jacob Astor. It was incorporated as a city in 1876. It is the centre of the salmon fishing, having two-thirds of the fish-canneries on the Columbia river. It makes large foreign and domestic shipments of salmon, lumber, oil, leather, wheat and flour. It has an excellent system of water-works, banks, churches, newspapers, good schools, and a hospital conducted by the Sisters of Charity. A railway connecting it with the Northern Pacific is in process of construction (1897). Pop. 1890, 6184.

ASTOR LIBRARY, in the city of New York, founded by John Jacob Astor, and largely increased by his son, William B. Astor. The edifice on Lafayette place is excellently adapted to the purpose, and occupies nearly the whole of a lot 235 by 120 ft. It is of brick, of the Byzantine order, finely ornamented with brown-stone moldings. The original library room is 100 by 64 ft., and 50 ft. high, and is reached by 36 marble steps. This building was opened Jan. 9, 1854, but it soon became too small for its purpose, and William B. Astor erected a building adjoining, exactly corresponding in style and size, which was opened Sept. 1, 1859. The grandson of the founder, Mr. John Jacob Astor, conveyed to the library, by deed of gift, three lots of ground adjoining, 75 ft. front by 100 ft. in depth, and in 1879 erected thereon an addition to the present library building, 65 ft. in front by 100 ft. deep, which was opened in 1881. With this addition the library possesses a front of 195 ft. and a depth of 100 ft., with an increased capacity for books amounting to 120,000 volumes. For the year 1894 the income of the library was \$47,054.05, the number of bound volumes was 260,611 and the daily average of persons using the library was 287. Samuel J. Tilden directed in his will, dated April 23, 1884, that his executors should obtain from the legislature an act of incorporation for an institution to be called The Tilden Trust which should establish and maintain a free library and reading room in the City of New York. On the settlement of the litigation over his will, The Tilden Trust found itself possessed of the testator's fine private library together with a large amount of personal and real property for the new Institution, the value of the entire endowment being estimated at \$2,000,000. On May 23, 1895 a consolidated corporation was formed under the name of The New York Public Library, Astor, Lenox, and Tilden Foundations. This brought the Astor Library under the control of the executive department of the consolidated institution, but the existing staff of the Astor Library was retained. This arrangement has increased the resources of the Astor Library and enabled it to add greatly to the number of its books. See NEW YORK PUBLIC LIBRARY.

ASTRABAD', a t. in the n. of Persia, capital of the province of the same name, is built at the foot of the northern slope of the Elbruz mountains, on a small river which runs into A. bay, at the s.e. extremity of the Caspian, from which it is distant 20 miles. Lat. 36° 50' n., long. 54° 31' e. It was long the residence of the Kajar princes, from whom the present shah of Persia is descended; but on account of its situation in a

remote corner of the kingdom, it was not advanced to the dignity of the metropolis of Persia. Teheran, at the foot of the chain of mountains which separates Iran from Mazanderan, became the capital; and since then the importance of A. has considerably sunk. It is still inclosed by a dry ditch and mud-wall, 3 m. in circumference, but its great towers have disappeared. Trade has increased since the establishment of a Russian consulate. The causeway constructed by shah Abbas is kept in good repair, and connects A. with Khorassan, Afghanistan, etc. Pop. 15,000. The t. is a very unhealthy residence during the summer rains.

ASTRÆA, daughter of Zeus and Themis, or of Astræus and Aurora, was the goddess of justice, the last of all the goddesses who left the earth when the golden age had passed away and men began to forge weapons and perpetrate acts of violence. She took her place in heaven as the constellation Virgo in the zodiac.—Greek art usually represented her with a pair of balances in her hand, and a crown of stars on her head.—A. is also the name of one of the planetoids (q.v.).

ASTRÆA. See CORAL and MADREPORE.

ASTRAGALUS, a bone of the foot, which, by a convex upper surface and smooth sides, forms, with the leg-bones, the hinge of the ankle-joint. Its lower surface is concave, and rests on the *os calcis*, or heel-bone, to which it is attached by a strong ligament. In front, it has a round head, which rests in the concavity of the scaphoid, another bone of the tarsus, and upon an elastic ligament, its pressure upon which gives in a great measure the necessary elasticity to the foot: it is at this joint that inversion and eversion of the foot take place. It will be seen that the A. is a bone of great importance to the member, as it supports the weight of the body in standing, and enters into most of the movements of the foot. It is occasionally displaced, generally in front of the outer ankle.

ASTRAGALUS, a genus of plants of the natural order *leguminosæ*, sub-order *papilionaceæ*. The pod is more or less perfectly 2-celled. The leaves are pinnate, with a terminal leaflet. The species are numerous, natives chiefly of the temperate and colder parts of the old world, shrubby, and often spiny, or unarmed and herbaceous. A number of the shrubby species yield the substance called tragacanth (which see under GUM). *A. boëticus*, an annual, native of the s. of Europe, with upright branching stems, is cultivated in Hungary, Germany, and other parts of Europe, for its seeds, which are roasted, ground, and used as a substitute for coffee, or mixed with it to improve its flavor.—The sweet milk-vetch, or wild licorice (*A. glycyphyllos*), a native of Britain and other parts of Europe, perennial, with long and very thick roots, which penetrate deep into the soil, and almost prostrate stems, 3 ft. in length, is occasionally cultivated for food of cattle, yielding a very abundant herbage. Cattle are not fond of it at first, but are said to become fond of it after being accustomed to it for some time. The roots have somewhat of the sweetness of licorice.

ASTRAKHAN, originally a province of the Mogul empire, but united with the Russian empire in 1554. At present, A. forms one of the s.e. governments of Russia in Europe, and is bounded on the s. by the Caspian sea and the Caucasus; on the w., by the country of the Don Cossacks; on the n., by the government of Saratov; and on the e., by Orenburg. Area, 91,327 sq.m.; pop. '92, est. 878,991. The province of A. is almost entirely a barren waste, the only fertile portions being the banks of the Volga, which divides the province into two equal parts. Salt is procured from the marshes of the steppes, considerable numbers of cattle are reared, and the annual value of the sturgeon-fishing in the Volga is very great. The climate varies from 70° F. in summer, to 13° in winter. The population is composed of diverse elements—Russian, Tartar, Georgian, Armenian, Bokharese, Persian, and Hindoo.

ASTRAKHAN, the chief t. of the government of the same name, is situated on an island of the Volga, and near the Caspian sea, in lat. 46° 21' n., and long. 48° 4' e. It is the seat of a Greek archbishop and an Armenian bishop; has Greek, Roman Catholic, Protestant, and Armenian churches; many mosques, an Indian temple, a gymnasium, a seminary for priests, a botanical garden, and many manufactories. Pop. '91, 104,856. The houses are mostly of wood, and irregularly built. The fisheries in the Volga supply occupation to great numbers of the inhabitants of A. and its neighborhood. The principal exports are leather, linen, and woolen goods, salted sturgeon, caviare, and isinglass. Imports consist chiefly of gold-embroidered silken goods from Persia, silk stuffs, woolen goods, rice, rhubarb, raw silk, drugs, etc. From July to Oct. the neighborhood of A. is frequently visited by swarms of locusts.—A. is the name of a fine description of fur, the produce of a variety of sheep found in Bokhara, Persia, and Syria.

ASTRAL SPIRITS. The star (Gr. *astron*) and fire worship of the eastern religions rested on the doctrine that every heavenly body is animated by a pervading spirit, forming, as it were, its soul; and this doctrine passed into the religio-physical theories of the Greeks and Jews, and even into the Christian world. In the demonology or spirit-systems of Christendom in the middle ages, A. S. are conceived of sometimes as fallen angels, sometimes as souls of departed men, sometimes as spirits originating in fire, and hovering between heaven, earth, and hell, without belonging to any one of these provinces. Their intercourse with men and their influence were variously represented,

according to the notion formed of their nature. As the belief in spirits and witchcraft reached its height in the 15th c., the demonologists, or special students of this subject, systematized the strange fancies of that wild period; and A. S. were made to occupy the first rank among evil or demoniacal spirits. Paracelsus, however, and others attributed to every human being an astral spirit, or sidereal element, in which the human soul, or spirit proper, is thought to inhere, and which lives for a time after the person dies.

ASTRINGENTS, medicines employed for the purpose of contracting the animal fibers and canals, so as to check fluxes, hemorrhage, and diarrhea. The drugs most commonly used as A. are alum, catechu, oak-galls, rhatany-root, etc. Many of the vegetable A. owe that property, in whole or in great part, to tannin. A severe degree of cold is a powerful astringent.

ASTROCA'RYUM (from the Gr. *astron*, a star, and *karyon*, a nut), a genus of palms, of which about sixteen species are known, natives of tropical America, remarkable for the abundance of acute and formidable spines—in some cases a foot long—with which almost every part—stem, leaves, spathe, and fruit-stalk—is armed. They have beautiful pinnated leaves; some of them are lofty, others are of very moderate height, as 8 to 15 ft., whilst some are almost or altogether stemless. The fruit of some species is eatable—a juicy pulp covering a stony seed—as the fruit of the MURUMURÚ palm (*A. murumuru*), the pulp of which is said to resemble a melon in flavor, has a sort of musky odor, and is highly esteemed. It is a palm of only about 8 to 12 ft. high, abundant about Pará and elsewhere on the Amazon. Cattle roam the forests in quest of its fruit, and swine fatten on the seed, which they crush with their teeth, although to break it requires a smart blow of a hammer, and in hardness it almost resembles vegetable ivory. Another edible fruit is that of the TUCUMÁ palm (*A. tucuma*), abundant in the same regions. These fruits are about an inch long, the murumurú ovate, the tucumá almost globular. The tucumá palm is 30 to 40 ft. high, the stem encircled with narrow rings of black spines, which are disposed with beautiful regularity. The TUCUM palm (*A. vulgare*), a species quite distinct from the tucumá, and more lofty, is of great importance to the Indians, and in places where it is not indigenous, is cultivated with care for the sake of the epidermis of its unopened leaves, of which they make cordage, very useful for bow-strings, fishing-nets, etc. The fiber is at once fine, strong, and durable, and may yet perhaps become important as an article of commerce. Beautiful hammocks are made of tucum thread, which are sold at about £3 each, or if ornamented with feather-work borders, at twice that sum. Martius, in his great work on palms, has, by mistake, represented the tucumá instead of the tucum palm as yielding this fiber. See Wallace, *Palm Trees of the Amazon*, Lond., 1853. The fiber is obtained by cutting down the terminal bud or column of unopened leaves which rises from the center of the crown of foliage. The tender leaflets are then carefully stripped of their epidermis, in pale, ribbon-like pellicles, which shrivel up almost to a thread. These are tied in bundles and dried, and are afterwards twisted into thread, or made into thicker cords, by mere rolling and manipulation.

ASTROLABE (from two Greek words signifying “to take the stars”), the name given by the Greeks to any circular instrument for observing the stars. Circular rings, arranged as in the armillary sphere (q.v.), were used for this purpose. A projection of the sphere upon a plane, with a graduated rim and sights for taking altitudes, was known as an A. in the palmy days of astrology, and was the badge of the astrologer. The A. has been superseded by the more perfect instruments of modern astronomy.

ASTROLOGY meant originally much the same as *astronomy*, “the knowledge of the stars,” but was at length restricted to the science of predicting future events, especially the fortunes of men, from the positions of the heavenly bodies. This was considered the higher, the real science; while the mere knowledge of the stars themselves, their places and motions (astronomy), was, till a very recent period, cultivated mostly with a view to (judicial) astrology. A. is one of the most ancient forms of superstition, and is found prevailing among the nations of the east (Egyptians, Chaldeans, Hindoos, Chinese) at the very dawn of history. The Jews became much addicted to it after the captivity. It spread into the west and to Rome about the beginning of the Christian era. Astrologers played an important part at Rome, where they were called Chaldeans and mathematicians; and though often banished by the senate and emperors under pain of death, and otherwise persecuted, they continued to hold their ground. The Roman poet Manilius, author of an astronomical poem still extant, was addicted to A.; and even Ptolemy the astronomer did not escape the infection, which in his time had become universal. It accords well with the predestinarian doctrines of Mohammedanism, and was accordingly cultivated with great ardor by the Arabs from the 7th to the 13th century. Some of the early Christian fathers argued against the doctrines of A., others received them in a modified form. In its public capacity, the Catholic church several times condemned the system; but many zealous Catholics, even churchmen have cultivated it. Cardinal d'Ailly, “the eagle of the doctors of France” (d. 1420), is said to have calculated the horoscope of Jesus Christ, and maintained that the deluge might have been predicted by A. For centuries the most learned men continued devoted to this delusive science; Regiomontanus, the famous mathematician Cardan, even Tycho Brahé and Kepler, could not

shake off the fascination. Kepler saw the weakness of A. as a science, but could not bring himself to deny a certain connection between the positions ("constellations") of the planets and the qualities of those under them. The Copernican system gave the death-blow to A. When the earth itself was found to be only one of the planets, it seemed absurd that all the others should be occupied in influencing it. The argument has really little force, but it produced the effect. Belief in A. is not now ostensibly professed in any Christian country, though a few solitary advocates have from time to time appeared, as J. M. Pfaff in Germany, *Astrologie* (Bamb., 1816). But it still holds sway in the east, and among Mohammedans wherever situated. Even in Europe the craving of the ignorant of all countries for divination is still gratified by the publication of multitudes of almanacs containing astrological predictions, though the writers no longer believe in them.

Many passages of our old writers are unintelligible without some knowledge of astrological terms, numbers of which have taken root in the language. In the technical rules by which human destiny was foreseen, the heavenly *houses* played an important part. Astrologers were by no means at one as to the way of laying out those houses. A very general way was to draw great circles through the n. and s. points of the horizon, as meridians pass through the poles, dividing the heavens, visible and invisible, into twelve equal parts—six above the horizon, and six below. These were the twelve houses, and were numbered onward, beginning with that which lay in the e. immediately below the horizon. The first was called the house of life; the second, of fortune, or riches; the third, of brethren; the fourth, of relations; the fifth, of children; the sixth, of health; the seventh, of marriage; the eighth, of death, or the upper portal; the ninth, of religion; the tenth, of dignities; the eleventh, of friends and benefactors; the twelfth, of enemies, or of captivity. The position of the twelve houses for a given time and place—the instant of an individual's birth, for instance—was a *theme*. To construct such a plan was to *cast* the person's nativity. The houses had different powers, the strongest being the first; as it contained the part of the heavens about to rise, it was called the *ascendant*, and the point of the ecliptic cut by its upper boundary was the *horoscope*. Each house had one of the heavenly bodies as its *lord*, who was strongest in his own house.

ASTRONOMY (Gr. *astron*, a star, *nomos*, a law) teaches whatever is known of the heavenly bodies. A. may be properly divided under three heads,—*Astro-mechanics*, which deals with the mathematical laws governing the heavenly bodies; *astro-physics*, treating of their physical and chemical constitution; and *astrometry*, which includes the art of making measurements with astronomical instruments. This last branch is sometimes called practical A.

Such parts of this extensive subject as are deemed suited to the present work, will be found under their appropriate heads, such as ABERRATION OF LIGHT, CIRCLE, COMET, EQUATOR, FIXED STARS, LIBRATION, PARALLAX, PLANETIDS, PLANETS, PRECESSION, REFRACTION, SOLAR SYSTEM, SUN, TIME, TRANSIT INSTRUMENT, etc. A brief sketch of the history of astronomical discovery is all that can be attempted in the present article.

The history of A. dates from a very early period. It is the most ancient of all the sciences. The Chinese, Hindoos, Chaldeans, Egyptians, and even the Greeks, are known to have investigated the heavens very long before the Christian era. But with the first four nations, A. may be said to have been a sentiment rather than a science—a vague notion built up out of crude speculations, rather than a correct theory founded on systematic observation. In China, A. was intimately associated with state politics; the Indians, Chaldeans, and Egyptians made it a matter of religion; and each of these nations applied it to astrological purposes. In Greece alone was it prosecuted for its own sake.

The Chinese, Chaldeans, Hindoos, and Egyptians each claim the honor of having been the first students of A., and each has had advocates to support its claim. The Tirvalore tables (asserted by the Hindoos to belong to an epoch of 3102 years B.C.—the commencement of the Cali-yug, or iron age, of their mythology—at which period a conjunction of the sun, moon, and planets is said to have occurred) are, so far as their date is concerned, altogether unreliable. Modern calculations have conclusively proved that no such conjunction could possibly have taken place at the time specified; and the elements of the tables are, in the general opinion of scientific men, of a character far in advance of the actual observations of that period. There is no doubt that the epoch is fictitious—that the date of these tables is fixed much earlier than their internal evidence justifies; but it is matter of dispute whether they were the result of the observations of Hindoos themselves at some later period before the Christian era, or whether they were constructed after that era from data furnished to them by the Arabs or Greeks. Those who hold the former view, quote the well-known mathematical attainments of the Indians, and their aversion to intercourse with foreigners, as arguments in its favor; those who support the latter, point out that the tables are a mean between those of Ptolemy and Albategnius, or Al Batani, a distinguished Arabian astronomer, and therefore likely to have been derived from these two sources. Those who are interested in the question of the originality of these tables, may refer to Delambre, and to Bailly's *Hist. de l'Astronomie Indienne*.

The Chinese have astronomical annals claiming to go back 2857 years B.C. In these

there is little record of anything but of the appearance of comets and solar eclipses; and regarding the latter phenomena, they tell nothing, save the fact and date of their occurrence. Professional astronomers were compelled to predict every eclipse under pain of death. The popular idea was that an eclipse was a monster having evil designs on the sun, and it was customary to make a great noise by shouting, beating of gongs, etc., in order to frighten it away from its solar prey. The many eclipses which the Chinese report have been recalculated, but not more than one anterior to the time of Ptolemy could be verified. At an early period, however, the Chinese appear to have been acquainted with the luni-solar cycle of 19 years (introduced into Greece by Meton, and since known as the Metonic cycle), and they had also divided the year into $365\frac{1}{4}$ days. Solstitial observations are said to have been made by a gnomon in the 11th c. B.C. To the burning of all scientific books by one of their princes (Tsin-Chi-Hong-Ti), 221 B.C., the Chinese attribute the loss of many theories or methods previously in use. The precession of the equinoxes was not known to the Chinese until 400 A.D., but long prior to that they were familiar with the motion of the planets.

The mass of evidence seems in favor of the plains of Chaldea being the primal seat of observative A. The risings and settings of the heavenly bodies and eclipses were subjects of observation and notation by their priests at a very remote period. Simplicius and Porphyry mention that Aristotle had transmitted to him from Babylon, by order of Alexander the great, a catalogue of eclipses observed during 1903 years preceding the conquest of that city by the Macedonians. Ptolemy gives six of the eclipses from this catalogue, but the earliest does not extend further back than 720 B.C. The probability therefore is that the statement of Simplicius, as to their early date, is an exaggeration. In these observations, the time is only given in hours, and the part of the diameter eclipsed within a quarter; but rough as they are, they are the earliest reliable observations extant; and a comparison of them with modern observations, led Halley to the discovery of the doctrine of the moon's acceleration—that is, that she now moves round the earth with greater velocity than formerly. It is remarkably illustrative of their habit of diligent observation, that the Chaldeans were acquainted with the cycle of $6585\frac{1}{4}$ days, during which the moon makes about 223 synodical revolutions, and experiences the same number of eclipses, alike, too, in order and magnitude, comparing cycle with cycle. The clepsydra as a clock, the gnomon for determining the solstices, and a hemispherical dial for ascertaining the positions of the sun, were used by the Chaldeans, and they have the credit of the invention of the zodiac and the duodecimal division of the day.

The Egyptians, it is supposed, were the first instructors of the Greeks in A. They do not, however, appear to have observed much for themselves. The meaning of what data they have left behind them can be guessed at only in a few instances. No mention is made by Ptolemy of the idea ascribed to them, that the planets Mercury and Venus moved round the sun; the probability therefore is, Ptolemy not being likely to overlook such a novel theory, that they entertained no such notion at the time of his visit, but that it is an after-thought of more recent ages. From the accuracy with which some of the pyramids face the cardinal points, there is a supposition that they must have been erected for astronomical purposes; but if it be true, as is stated, that Thales taught the Egyptians how to find the height of the pyramids by the shadow, and that the latter informed Herodotus that the sun had twice been seen to rise in the west, the conclusion is that the A. of the ancient Egyptians was very meager and absurd.

Up to this time, A. is little else than tradition. The Greeks have the honor of elevating it into a reliable history, and to the dignity of a science. Thales (640 B.C.), the founder of the Ionic school, laid the foundation of Greek A. He it was who first propagated the theory of the earth's sphericity. The sphere he divided into five zones. He predicted the year of a great solar eclipse, but this it is now supposed he must have casually succeeded in doing—the Greeks at this time having no observations of their own to guide them—by means of the Chaldean saros, or period of 18 years and 10 days, which gives a regular recurrence of eclipses. He made the Greeks, who, prior to his time, were content to navigate their vessels by the Great Bear—a rough approximation to the north—acquainted with the lesser constellation of that name, a much better guide for the mariner. His system, however, contained a good deal of absurdity. Among other things, he held that the stars were composed of fire, and that the earth was the center of the universe. The successors of Thales held opinions which in many respects are wonderfully in accordance with modern ideas. Anaximander, it is said, held that the earth moved about its own axis, and that the moon's light was reflected from the sun. To him is also attributed, on somewhat slender authority, the belief in the grand idea of the plurality of worlds. Anaxagoras, who transferred the Ionic school from Miletus to Athens, is said to have offered a conjecture that, like the earth, the moon had habitations, hills, and valleys.

Pythagoras (500 B.C.), who was the next astronomer of eminence, was very far in advance of his predecessors. He promulgated, on grounds fanciful enough, the theory, the truth of which, however, has been since established, that the sun is the center of the planetary world, and that the earth circulates round it. Pythagoras also first taught that the morning and evening star were in reality one and the same planet. But the views of Pythagoras met with little or no support from his successors until the time of

Copernicus. Between Pythagoras and the advent of the Alexandrian school, nearly a couple of centuries later, the most prominent names in astronomical annals are those of Meton (432 B.C.), who introduced the luni-solar cycle, as already intimated, and, in conjunction with Euctemon, observed a solstice at Athens in the year 424 B.C.; Callippus (330 B.C.), who improved the Metonic cycle; Eudoxus of Cnidus (370 B.C.), who brought into Greece the year of $365\frac{1}{4}$ days, and wrote some works on A.; and Nicetas of Syracuse, who is reported to have taught the diurnal motion of the earth on its axis.

To the Alexandrian school, owing its existence to the munificent Ptolemies, we are indebted for the first systematic observations in A. Hitherto the truths of A. rested on no better evidence than the conjectures of sagacious minds, and these being opposed to the testimony of the senses, met with but little acceptance from the world. The Alexandrian school originated a connected series of observations relative to the constitution of the universe. The positions of the fixed stars were determined, the paths of the planets carefully traced, and the solar and lunar inequalities more accurately ascertained. Angular distances were calculated with instruments suitable to the purpose by trigonometrical methods, and ultimately the school of Alexandria presented to the world the first system of theoretical astronomy that had ever comprehended an entire plan of the celestial motions. The system we know to be false, and inferior to the Pythagorean notions; but it had the merit of being founded upon a long and patient observation of phenomena, a principle which finally brought about its own destruction, while the previous theories were the results of pure hypothesis.

The most interesting circumstances connected with the early history of the Alexandrian school are the attempts made to determine the distance of the earth from the sun, and the magnitude of the terrestrial globe. Aristarchus of Samos—the pioneer of the Copernican system, as Humboldt calls him—is the author of an ingenious plan to ascertain the former. See ARISTARCHUS OF SAMOS.

Among other eminent members of this school were Timocharis and Aristyllus, who made the observations which, together with observations of his own, enabled Hipparchus (q.v.) to discover the precession of the equinoxes; Eratosthenes (q.v.), who was the first who attempted to determine on true principles the magnitude of the earth, and to clear, as Humboldt expresses it, “the description of the earth from its fabulous traditions;” and Autolycus, whose books on A. are the earliest extant in the Greek language.

We have now arrived at by far the greatest name we have yet met in astronomical science—that of Hipparchus of Bithynia (160–125 B.C.), and here may be said to begin the real written history of scientific A.; for not until his era were there facts correct enough and sufficient in number upon which to build a system. Hipparchus was at once a theorist, a mathematician, and an observer. He catalogued no less than 1081 stars. This is the first reliable catalogue we have. He discovered, as we have already mentioned, the precession of the equinoxes; he determined, with greater exactitude than his predecessors had done, the mean motion as well as the inequality of the motion of the sun; and also the length of the year. He also determined the mean motion of the moon, her eccentricity, the equation of her center, and the inclination of her orbit; and he suspected the inequality afterwards discovered by Ptolemy (the evection). He invented processes analogous to plane and spherical trigonometry, and was the first to use right ascensions and declinations, which he afterwards abandoned in favor of latitudes and longitudes.

For more than two centuries and a half after the demise of this indefatigable astronomer, we meet with no name of note. Ptolemy (130–150 A.D.) is the next who rises above the mass of mediocrities. Besides being a practical astronomer, he was accomplished as a musician, a geographer, and mathematician. His most important discovery in A. was the libration or evection of the moon. He also was the first to point out the effect of refraction. He extended and improved many of the theories of Hipparchus, and was the founder of the false system known by his name, and which was universally accepted as the true theory of the universe, until the researches of Copernicus exploded it. The Ptolemaic system, expounded in the *Great Collection*, or, as it was called by the Arabs, the *Almagest*—from which source most of our knowledge of Greek A. is derived—placed the earth immovable in the center of the universe, making the entire heavens revolve round it in the course of twenty-four hours.

With Ptolemy closes the originality of the Greek school. His successors were men of no mark, confining themselves for the most part to astrology, or to comments on earlier writers. It is to the Arabs that we owe the next advances in A. They commenced making observations 762 A.D., in the reign of the Caliph Al Mansur, who gave great encouragement to science, as did also his successors, the “good Haroun al Raschid” and Al Mamoum, both of whom were themselves diligent students of A. For four centuries the Arabs prosecuted the study of the science with assiduity, but they are chiefly meritorious as observers. They had little capacity for speculation, and throughout held the Greek theories in superstitious reverence. They, however, determined with much more accuracy than the Greeks had done the precession of the equinoxes, the obliquity of the ecliptic, and the solar eccentricity; and the length of the tropical year was ascertained within a few seconds of the truth. The most illustrious of the Arabian school were Albategnius or Al Batani (880 A.D.), who discovered the motion of the solar apogee (see ANOMALISTIC YEAR), and who was also the first to make use of sines and versed

sines instead of chords; he corrected the Greek observations, and was altogether the most distinguished observer between Hipparchus and the Copernican era; and Ibn-Yunis (1000 A.D.), an excellent mathematician, who made observations of great importance in determining the disturbances and eccentricities of Jupiter and Saturn, and who was the first to use cotangents and secants.

In the northern part of Persia, an observatory was erected by a descendant of the renowned warrior Genghis Khan, where some tables were constructed by Nasir-Eddin; and at Samarcand, Ulugh Beg, a grandson of Timur, made, in 1433 A.D., many observations, and the most correct catalogue of stars which, up to his time, had been published.

In the 13th c., A. was again introduced into western Europe, the first translation from the *Almagest* being made under the emperor Frederick II, of Germany, about 1230; and in 1252 an impulse was given to the science by the formation of astronomical tables under the auspices of Alfonso X. of Castile. An Englishman, named Holywood (Sacrobosco), in 1220 wrote a book of great repute in its day on the spheres, chiefly abridged from Ptolemy; and among others who did much to promote a taste for A. were Purbach (1460), Regiomontanus (John Muller), who died in 1476, and Waltherus, a pupil of the latter, who made numerous observations of merit.

We now come to the illustrious name of Copernicus (b. 1473, d. 1543), to whom was reserved the grand honor and the danger—for there is ever danger in bringing old notions into disrepute by introducing new systems of truth—of exploding the Ptolemaic idea, and of promulgating a correct though imperfect theory of the universe. His system is in some part a revival and systematic application of the opinions said to have been held by Pythagoras. It makes the sun the immovable center of the universe, around which all the planets revolve in concentric orbits, Mercury and Venus within the earth's orbit, and all the other planets without it. In the Copernican theory, there were many of the old notions which have since been exploded. It is a current belief that Copernicus, afraid to state boldly such heterodox views of the universe as those he entertained, gave them forth in the form of an hypothesis. Humboldt, in his second volume of *Cosmos* (p. 345), denies that he did so. This distinguished authority says: "The language of Copernicus is powerful and free, and bursts forth from his inmost convictions, and thus sufficiently refutes the ancient opinion, that he has brought forward the system which is immortalized by his name, as an hypothesis made for the convenience of calculating astronomers, or for one which has but a probable foundation." The same author also refutes the popular notion that Copernicus died a few hours after receiving a printed copy of his book. He was broken down in body and mind when his work *On the Revolutions of the Heavenly Bodies* was brought to him, but he did not die until "many days afterwards, on the 24th May, 1543."

Among the contemporaries of Copernicus were Rheinhold, who constructed the Prutenic tables; Recorde, who was the first to write on A. in English; and Nonius, a Portuguese, who invented a method for dividing the circle. The study of A. was also much aided about this time by the liberality of the Landgrave of Hesse-Cassel, William IV.

Decidedly the most industrious observer and eminent practical astronomer from the time of the Arabs to the latter half of the 16th c. was Tycho Brahé (b. 1546, d. 1601). Considerable odium attaches to him on account of his repudiation of the Copernican system, but it should not be forgotten that in the time of Tycho that system was not supported by the conclusive evidence we are now in possession of. Tycho's system, which made the sun move round the earth, and all the other planets round the sun, they moving with it round the earth, explained all natural phenomena then observed equally well, while it must have appeared more probable than the crude and, at that era, undemonstrable theories of Copernicus. Tycho Brahé compiled a catalogue of 777 fixed stars, more perfect than any that had previously appeared. He made the first table of refractions, and discovered the variation and annual equation of the moon, the inequalities of the motion of the nodes, and the inclination of the lunar orbit, and rejected the trepidation of the precession, which had hitherto injuriously affected all tables. He also made some interesting cometary investigations.

To his researches are mainly due the discovery by Kepler (b. 1571, d. 1630) of those famous laws which have rendered his name immortal. See KEPLER. To Kepler is due the credit of divesting the Copernican system of its absurdities. Kepler is also said to have had some notion of the law of gravitation.

Galileo Galilei (b. 1564, d. 1642) first applied the telescope (which he made from a general description of the instrument of Hans Lipperhey of Holland, who was the first inventor of the telescope) to the investigation of the heavens. He was rewarded by the discovery of the inequalities on the moon's surface. The important discoveries of the four satellites of Jupiter, the ring of Saturn—not then distinctly recognized as a circle—the spots on the sun, and the crescent form of Venus, followed in quick succession. For propagating the Copernican doctrine of the world, Galileo incurred the displeasure of the priests, and was compelled by the Inquisition to retract his opinions.

But the eternal laws of nature are not to be suspended by the recantation of a philosopher forced by the tyranny of priestcraft. The earth moved grandly on round the sun in spite of both; and scientific truth was now too old to remain in the restrictive leading-strings of any ecclesiasticism.

The next great epoch in the history of A. brings us to England and Newton (b. 1642, d. 1727). In the interval, practical A. had profited largely by the logarithms of Napier; the mathematical researches of Descartes; the application of the telescope to the quadrant by Gascoigne, an Englishman, and afterwards by Auzout and Picard; by Römer's discovery of the progressive motion, and measurement of the velocity, of light; by the invention of Vernier; and the application of the pendulum to clocks by Huyghens, who also brought into use the spiral spring, and made some valuable observations on the ring and satellites of Saturn; as well as by the investigations of Norwood, Horrocks, Hooke, Hevelius, Gilbert, Leibnitz, and Dominicus Cassini, to the last of whom especially the scientific world owes much. Among a variety of other valuable observations and discoveries may be mentioned his thorough investigation of the zodiacal light, his determination of the rotations of Jupiter and Mars, and of the motions of Jupiter's satellites from their eclipses, his discovery of the dual character of Saturn's ring, and also of four of his satellites. Newton's fame rests upon his discovery of the law of gravitation, upon which the common belief is he was led to speculate by the fall of an apple. Newton announced his discovery in the *Principia* in 1687, which was briefly that every particle of matter is attracted by, or gravitates to, every other particle of matter, with a force inversely proportional to the squares of their distances. The first gleam of this grand conclusion is said to have so overpowered Newton that he had to suspend his calculations, and call in a friend to finish the few arithmetical computations that were incomplete. This discovery is perhaps the grandest effort of human genius of which we have any record. Newton also made the important discovery of the revolution of comets round the sun in conic sections, proved the earth's form to be an oblate spheroid, gave a theory of the moon and tides, invented fluxions, and wrote upon Optics.

While the foundations of physical A. were thus broadly laid by Newton, Flamsteed—the first astronomer-royal at Greenwich, to whom, until recently, scant justice has been done—and Halley were greatly improving and extending the practical department of the science. To the former we are indebted for numerous observations on the fixed stars, on planets, satellites, and comets, and for a catalogue of 2884 stars. His *Historia Cœlestis* formed a new era in sidereal A. Dr. Halley, who succeeded Flamsteed as astronomer-royal, discovered the accelerated mean motion of the moon, and certain inequalities in Jupiter and Saturn, but he is most famed for his successful investigations into the motions and nature of comets. His successor was Dr. Bradley, who, in the year of Newton's death, made the important discovery of the aberration of light, which furnishes the only direct and conclusive proof we have of the earth's annual motion. To him also we are indebted for our knowledge of the nutation of the earth's axis. He was, besides, an unwearied observer, and left behind him at his death upwards of 60,000 observations. Altogether, Bradley's is deservedly one of the most honored names in modern A. Dr. Maskelyne, who was appointed to the observatory after Bradley, originated the *Nautical Almanac*.

Merely to mention the names of men who from the death of Bradley to the present time have added, by theory and practice, to our knowledge of A., would extend this synopsis much beyond the limit necessarily assigned to it. If the 18th c. opened with lustre derived from the physical demonstrations of Newton, it closed magnificently with the telescopic discoveries of Sir William Herschel, who added to our universe a primary planet (Uranus) with its satellites, gave two more satellites to Saturn, resolved the milky-way into countless myriads of stars, and unraveled the mystery of nebulae and of double and triple stars. Laland, Lagrange, Lacaille, and Delambre, in the latter half of the 18th c., did much by their researches and analyses to systematize and improve the science of A. The instrumental means of observation were also, during that time, brought to high perfection. Laplace, in his great work the *Mécanique Céleste* (1799–1808), gave what further proof was needed of the truth and sufficiency of the Newtonian theory.

The 19th c. opened with the discovery of the four small planets—Ceres, in 1801, by Piazzi; Pallas and Vesta by Olbers—the former in 1802, and the latter in 1807; and Juno, by Harding, in 1804. In 1845, Hencke discovered the fifth of this group revolving between Mars and Jupiter, to which the name of Astræa was given; and by the end of 1879, 200 planetoids (q.v.) had been discovered. The greatest event of the first half of the century has been the discovery of the planet Neptune in 1846.

Observations upon Uranus had shown the motions of that planet to present great irregularities, which could not be explained by the action of Jupiter and Saturn; and after carefully examining the analytical theory of Uranus, Leverrier, a young academicien of France, in the summer of 1846, published the elements of an undiscovered planet, the cause of the perturbations. He boldly predicted its existence, calculated its mass, and referred to its place in the heavens; and scarcely a month afterwards, on the 23d of Sept., the hitherto concealed object (Neptune) was found by M. Galle of Berlin. But it has only been by accidental circumstances that France has the honor of this remarkable achievement. Mr. Adams of Cambridge had arrived at results more perfect than those of Leverrier, and had communicated them to Mr. Challis, professor of A. at Cambridge in Sept., 1845, a year before the discovery of the planet, and nearly a year before the publication of Leverrier's final calculations. Mr. Challis, it appears, commenced a search for the planet on July 29th, and on Aug. 4th and 12th, he actually seized the

planet, and recorded two positions of it, but did not recognize it, through not comparing his observations, which a pressure of occupation, and an impression that the discovery required a much more extensive search, prevented. But for this, and the non-publication of the Cambridge mathematician's results at the time they were forwarded to Sir George Airy in Oct., 1845, the honorable position of M. Leverrier would have been occupied by Mr. Adams, and that of M. Galle by Mr. Challis.

The latter half of the century has been remarkable chiefly for the development of astronomical photography of precision, due principally to Rutherford of New York, and for the application of the spectroscope to the measurement of the motion of the fixed stars in the line of sight. This method of research, invented by Huggins of London, and brought to a high state of perfection under the direction of Vogel, at the observatory of Potsdam, has enriched A. with an entirely new body of knowledge. For it was formerly possible to measure on the sky only the *directions* of the heavenly bodies, and we had to depend for our knowledge of velocities upon calculation. The spectroscope has now enabled us to measure linear velocities directly. The present century has also witnessed laborious efforts to correct, systematize, and extend the results of former discoveries. Admirable and extensive catalogues of stars and double stars, and of nebulae, have been made; and optical and other instruments have been brought to what appears almost a state of perfection, the 36-inch refracting telescope of the Lick observatory and the new 40-inch instrument of the Yerkes observatory in Chicago being triumphs of modern mechanical and mathematical skill.

ASTRUC, JEAN, 1684-1766; a French physician. He had the anatomical chair in Toulouse, became professor after Chirac in Montpellier medical college, regent and professor of the faculty of medicine in Paris, and physician to the king. His attention was given chiefly to venereal and sexual diseases, in which he is regarded as excellent authority, his *De Morbis Venereis Libri Sex* being known in most languages. He wrote also on diseases of women, and on obstetrics.

ASTUR. See FALCONIDÆ and GOSHAWK.

ASTURIAS (OVIEDO), a former division of Spain, now included in the province of Oviedo, bounded on the n. by the bay of Biscay, e. by Santander, s. by Leon, and w. by Galicia. The low hills of Leon and Old Castile rise gradually to the mountain-chain which forms the s. boundary and towers to a height of about 11,000 ft. in the summit *Peña-de-Pñaranda*. The northern slopes are broken by steep and dark valleys or chasms, which are among the wildest and most picturesque in Spain. The summits of the mountains are covered with snow even as late in the year as August. The climate is damp; clouds hang almost continually about the peaks, gathering to them the fogs of the Atlantic. From the mass of calcareous rock, marble crags rise from 200 to more than 400 ft. The principal kinds of wood are oak, chestnut, silver, and Scotch firs. Some of the forests in the remoter districts are very superb. Alpine pasturage decks the slopes, and a richer covering of green is found in the narrow valleys. In the wider valleys, the soil yields barley, wheat, maize, figs, olives, grapes, oranges. The coasts have good fisheries. The chief minerals of the province are copper, iron, lead, cobalt, arsenic, antimony, and coal. The pasturage of the higher valleys supports an excellent breed of horses, with numerous horned cattle.

A. was never firmly occupied by the Arabs, but afforded a place of refuge to the Goths in the 8th century. Here the famous Pelayo was made king in 718 A.D.; and his successors, after contending successfully against the Arabs, were made kings of Leon in the 10th century. The Asturian still boasts of his independence as a free hidalgo, and is simple in manners and brave, but less industrious and sociable than his neighbors in Biscay and Galicia. Many Asturians leave their province to seek a livelihood in other parts of Spain, and after saving money, return to dwell among their native hills and valleys. They have been termed the Swiss of Spain; and they are equally faithful and fond of money. Among them, the *Vaqueros* form a distinct caste, intermarrying among themselves, and leading a nomadic course of life, spending the winter on the sea-coast, and the summer on the hills of Leytariegos. OVIEDO, the capital, has, since 1833, given its name to the whole province. The other considerable towns are the ports Gijon and Aviles. The whole area of the province of Oviedo includes 4091 sq. m., with a population of (1887) 595,420.

The eldest son of the Spanish king has the title of prince of A., professedly an imitation of the English prince of Wales, having been taken at the solicitation of the duke of Lancaster in 1888, when his daughter married the eldest son of Juan I.

ASTY'AGES, the last King of Media, son and successor of Cyaxares, 595 B.C. Influenced by a dream, A. gave his daughter Nandane in marriage to Cambyzes, a Persian of eminence; and, again led by a dream which gave him alarm, he sent Harpagus to destroy the child which was the fruit of the marriage. But the child was hidden away by a shepherd, and it was after many years that his existence was brought to the notice of A., who easily discovered the boy's parentage. A. punished Harpagus for deceiving him, and Harpagus instigated Cyrus (the child now grown up) to lead a revolt, through which A. was made prisoner, and Cyrus took the scepter. A. was treated mildly, but kept a prisoner until his death.

ASUAY', ASSUAY, or AZUAY, a department of Ecuador, being all of the s. and e. portion of the republic, on the e. slope of the Andes, between 5° s. and 1° n., and 68° to

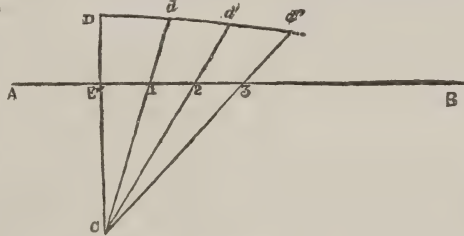
80° w.; about 120,000 sq. m.; pop. 243,459. There is a large desert in the west, but the eastern part is fertile, being watered by several affluents of the Amazon. The chief employments are cattle breeding, agriculture, and the gathering of cinchona bark. Loja and Cuenca are the chief towns.

ASUNCION, NUESTRA SEÑORA DE LA, or **ASSUMPTION**, the capital of Paraguay, 25° 16' s., 52° 42' w., on the e. bank of the Paraguay river. The city was founded in 1538, and for more than a century was the capital of all the Spanish territory along the Rio de la Plata. There are a cathedral, several other churches, a government palace, a public library, a college, etc. A railway connects it with Paraguari, and a line of steamers with Buenos Ayres. It has a considerable commerce, the principal articles of export being leather, tobacco, sugar and *maté* or Paraguay tea. Most of the houses are of brick and one story high. Population, 1886, 24,838; estimated 1895 at 45,000. The place is intensely warm in summer, but not especially unhealthy.

ASYLUM, a place of refuge. In ancient times, sacred places, especially the temples and altars of the gods, were appointed as asylums to which criminals, as well as persecuted individuals, might flee for refuge; and to molest them in such places was regarded as an impiety. An analogous institution is found in the laws of the Jews as described in the 35th chapter of Numbers, where six "cities of refuge" are appointed for persons guilty of manslaughter. Among the Greeks in early times, these asylums might be sometimes useful in preventing hasty retribution; but in the course of time they were so much abused that their sanctity was in a great measure disregarded. Thus Pausanias, who fled to the altar of Minerva, was taken and slain there by the Lacedæmonians, and in other cases the refugee was compelled to leave the A. by fire or starvation. In Rome, the emperor Tiberius abolished all such places of refuge from law, excepting those in the temples of Juno and Æsculapius. The custom of allowing to real or supposed criminals a place of safety in temples, was also adopted by the Christian church. In the time of Constantine the great, the churches were made asylums; and Theodosius II. extended the privilege to all courts, alleys, gardens, and houses belonging to the church. In 681 A.D., the synod of Toledo extended the privilege of A. to a space of 30 paces around every church. In the lawless periods of the middle ages, the influence of the church often prevented deeds of gross injustice and violence; but the sanctity of churches was abused by criminals; and this led to several modifications which gradually destroyed the privilege of sanctuary (q.v.). In England, it was abolished by acts passed in 1534 and 1697. The word A. is now applied to places of shelter for unfortunate or destitute persons, and especially to hospitals for the insane. See LUNACY.

ASYMPTOTE (Gr. not coinciding), a line that approaches nearer and nearer to some curve without ever meeting it. An example of an A. will be seen under **HYPERBOLA**.

As another illustration, let AB be a straight line which can be produced to any length towards B. Take any point, C, without the line, and draw a perpendicular reaching to any distance, D, beyond the line; set off any equal distances, E—1, 1—2, 2—3, etc., along AB; and draw C1*d*, C2*d'*, C3*d''*, etc., making 1*d*, 2*d'*, 3*d''*, etc., equal to ED. Now, it is evident that each of the points *d*, *d'*, etc., is nearer to the line AB than the one to the left of it; if, therefore, a curve is traced through these points (the curve is called the *conchoid*), it must continually approach the line AB. On the other hand, it is evident that the curve can never meet AB; for a line drawn from C to any point in AB, however distant that point, must, when produced cross AB. AB is thus an A. to the curve. To the senses, indeed, the curve and line soon become one, because all physical or sensible lines have breadth. It is only with regard to *mathematical* lines (see **LINE**) that the proposition is true; and the truth of it has to be conceived by an effort of pure reason, for it cannot be represented.



Asymptote.

ATACA'MA, formerly a department in s.w. Bolivia. It is mostly a barren, sandy desert, entirely uninhabitable; but in the n. part there are fertile valleys. The minerals are gold, silver, copper, and iron. In 1884 that part lying west of the Andes was annexed by Chili to her province of the same name described below. The part retained by Bolivia has a small area.

ATACA'MA, a province in n. Chili; a narrow strip between the Andes and the Pacific, w. of Bolivia; 41,180 sq. m.; pop. '94, 73,216. The copper and silver mines are the richest known; of silver there are about 250, and of copper nearly 1000 mines. Since the discovery of silver by the shepherd Juan Godoy, in 1832, the product has been considerably over \$100,000,000. The town of Chañarcillo is on the site of the silver discovery, 51 m. s.e. of Copiapo, the capital of the province, with railway connection. The first railway built in South America connects the capital with Caldera, the best ocean port of Chili.

ATAC'AMITE, an ore of copper, found as a crust on the lavas of Vesuvius and Etna, especially on those of Vesuvius erupted in the years 97, 1804, 1820, and 1822. It occurs abundantly in some parts of South America, as at Atacama in Peru, from which it derives its name; at Remolinos, Santa Rosa, and other districts in Chili; and at Sarapaca in Bolivia, where it is associated in veins with ores of silver. The natural varieties of A. are crystallized, massive, and pulverulent or granular. The massive or compact variety is usually reniform, with a fibrous structure. The crystals are short and needle-shaped; the primary form is a rhombic prism. It has been sometimes described as a chloride of copper, but incorrectly; and sometimes as a hydrochlorate (muriate) of copper; it is rather to be regarded as a combination of protoxide of copper with chloride of copper. It is a rich and productive ore, containing about 55 to 60 per cent of copper. The percentage composition of various specimens of A. is as follows:

	Copper protoxide.	Muriatic acid.	Water.	Total.
Compact atacamite	72.0	16.3	11.7	100
“ “	76.5	11.0	12.5	100
Sandy atacamite.....	70.5	11.5	18.0	100
Crystallized atacamite.	73.0	16.2	10.8	100

A. often forms on the surface of copper exposed to the air or sea-water; and the greenish incrustation observed on antique bronze utensils, weapons, and other articles, and commonly known as the *ærugeo nobilis*, is composed of this salt. On some antique bronzes from Egypt the A. is crystalline. Atacamite is worked in South America as an ore of copper; and considerable quantities are sent to England to have the metal extracted therefrom. See COPPER.

ATAHUALPA, the favorite son of Huayna Capac, Inca of Peru, who died in 1525, about seven years before Pizarro's arrival in Peru. The mother of A. not being of the pure Inca blood, her son was formally excluded from inheriting the throne; but his handsome figure, bold spirit, and quick intelligence so won upon the affections of his father, that, on his death-bed he declared it to be his will that A. should receive as his portion the ancient kingdom of Quito (recently conquered), while Huascar, his eldest son, should possess Peru. For five years the brothers lived on terms of real or apparent friendship; but at length the restless ambition of A., who was constantly aspiring to new conquests, excited the uneasiness of Huascar, who, in an evil hour, was induced to send an envoy to his brother, with instructions to require him to render homage for his kingdom of Quito. A. fired at the proposal, and war was instantly declared. Placing himself at the head of the army of veterans which his father had left him, he invaded Peru, and in the spring of 1532 completely defeated Huascar on the plains of Quipaypan, in the neighborhood of Cuzco, the native Peruvian metropolis, only a few months before the arrival of the Spaniards. Huascar was taken prisoner, and confined in the strong fortress of Xauxa. Then followed, according to Garcilasso de la Vega, a series of atrocious massacres of all in whose veins ran the blood of the Incas; but his statements are so monstrous, and possess so little congruity, that they are rejected by Prescott as intrinsically incredible. In the mean time, the Spaniards had disembarked at Tumbez; and after a long, brave, and perilous march through the unknown country, Pizarro, at the head of his 200 cavaliers, approached the victorious camp of A., where he found some 50,000 men assembled. By a daring but diabolical stratagem, Pizarro obtained possession of the person of the king, who had come to visit him in a friendly spirit. While a priest was explaining the Christian religion, and the power of the pope over all the kingdoms of the earth, and how the pope had presented Peru to the Spanish monarch, in whose name they had come, A., indignantly interrupting him, told him that the pope (whoever he was) must be a crazy fool to talk of giving away countries which were not his own. When he inquired on what authority such claims were made, the priest pointed to the Bible, on which A. dashed the book on the ground, and the fields began to fill with Indians. The moment was critical. The crime which Pizarro had resolved upon the night before must be executed then or never. He waved a white scarf, which was the signal agreed upon. The mysterious artillery poured sudden death into the terrified masses of Peruvians, while the Spanish cavalry rode them down with merciless fury. Confusion seized the natives; they submitted—being unarmed—to this horrible butchery, only anxious to save their sacred Inca; but all their efforts to accomplish this proved unavailing, and after exhausting hours in the miserable work of murder, the inhuman Spaniards succeeded in capturing him. A. was treated with a great show of kindness at first, and more especially when he offered, as a ransom, “not merely to cover the floor, but to fill the room in which he stood with gold as high as he could reach.” When A.'s brother, Huascar, who was still a prisoner, heard of this, he offered still more advantageous terms for himself. To prevent this, A. had him secretly assassinated. The golden treasure which was to constitute the ransom of A. now began to pour in, and at length A. demanded his freedom. This Pizarro refused to grant, and accused A. of plotting against him. The result, after much base treachery on the part of the Spaniard, was a mock-trial, in which A. was condemned to be burned. On the 29th of Aug., 1533, he was led to the stake, but on agreeing to be “baptized,” his sentence was commuted to death by strangulation.

ATALANTA, a mythical personage, the daughter of Jasus and Clymene, was born in Arcadia, and celebrated as a huntress, well skilled in the use of the bow and arrow. Her father, who had wished a son, exposed her, while an infant, on Mt. Parthenios, where she was found near the entrance of a cave by hunters, who are said to have brought her up, and afterwards restored her to her parents. While living as a wild mountain-maiden, she slew the centaurs Rhœcus and Hylæus. Afterwards, she sailed with the Argonauts (q.v.) to Colchis, and took a prominent part in the chase of the Calydonian boar (q.v.). She had many suitors, but was merciless in the conditions which she imposed on them. Being the swiftest of mortals, she offered to become the wife of him that should outstrip her—the penalty of defeat being death. At length she was conquered by a trick of one Meilanion, whom she was compelled to marry. He obtained from Venus a gift of three golden apples, which he successively dropped in the race; and A. was so charmed by their beauty, that she could not refrain from stooping to gather them, and so lost.—Mention is made of another A. in Greek antiquity, to whom a different parentage is assigned, but regarding whom the myth is essentially the same.

ATARAIPU', a term signifying *devil's rock*. It is applied to one of the most singular eminences in the world, a granite pyramid in British Guiana, which rises abruptly from the plain about 900 ft., wooded for rather more than one third of the height, but bare thence to the peaked summit.

ATASCO'SA, a co. in s. Texas on the upper branches of the Nueces; 1200 sq.m.; pop. '90, 6459. The climate is good, soil sandy and easily cultivated, but stock-raising is the main business. Co. seat, Pleasanton.

ATAULPHUS, ATAULF, or **ADOLF**, the brother-in-law of Alaric, and his successor as king of the Visigoths. He assisted Alaric in the siege of Rome, and after A.'s death went to Gaul, taking as a captive Placidia, sister of the Roman emperor Honorius; and she afterwards became his wife. Jornandes says A. took Rome a second time, carried off Placidia, and made a treaty with Honorius which was solemnized by the marriage with Placidia in the forum; that A. was a faithful ally of Rome in Gaul, and went to Spain to suppress insurrections of the Vandals, where, according to others, he was assassinated.

A'TAVISM in physiology, the resemblance of a man or other animal to a remote progenitor, as a man who resembles his great-grandfather and not the intermediate parents. Watson, in a lecture on the practice of medicine, cited this case: A deaf-mute married a woman whose hearing was normal; they had two children; a deaf-mute son who left no children, and a daughter with perfect hearing, who married a man with perfect hearing, and became the mother of two deaf-mute daughters and a hearing son; this son married a woman with perfect hearing, and by her had a deaf-mute son; one of the daughters married a deaf-mute and bore a son whose hearing was perfect. There are some diseases of hereditary nature that lie dormant for two or three generations and then develop, such as insanity and consumption. Darwin uses reversion as nearly synonymous with A., to denote not merely the recurrences of long lapsed physical traits, but even the returning to a remote variety of species. Domestic animals running wild will gradually lose their civilized development and become like wild animals of their species. All the wild horses in America are from stock imported from the old world, yet they are nearly of one color, size, and form. Darwin, looking further back, suggests that the occasional appearance of a striped horse or mule indicates descent from some equine genus long ago extinct.

AT'AXY LOCOMO'TOR, a nervous disease showing itself in disordered movements of the limbs of locomotion. It is not paralysis, but loss of power to order harmoniously the muscles that move the body and maintain equilibrium. It begins insidiously and grows slowly. The earlier symptoms are disorder of vision, uneasiness in the back, with shooting pains through the limbs; increasing or perverted sensibility, and disturbance in the genito-urinary functions. Later, the victim feels that his walking is not firm and sure; that there is some soft substance between his feet and the ground; he walks with difficulty, and with short and hurried steps; each leg is lifted well up, but as he moves it forward, it is thrown out from him and the heel descends with force while the sole comes awkwardly after it. He now requires the aid of vision to walk at all, and looks steadily at his feet or at a point a little in front of them, and he cannot make a sudden turn without great risk of falling. If he stand erect with his feet together or nearly so, and take his eyes off them, he begins to totter and would fall if not supported. These phenomena are not the result of weakness of motor power, but only of defective muscular co-ordination. Diminished sensibility in the feet and legs is usual in this disease. The upper limbs are sometimes affected, so that though the hands retain all their natural muscular power, the sufferer cannot unfasten a button, or pick up a pin, or feed himself. At later stages the disease renders walking impossible, the legs moving loosely about, and the control of the sight upon the feet ceasing. Then the patient takes to his bed, the pains and jerking of the limbs increase, the motor power is quite gone, and he sinks under complete exhaustion or some intercurrent disease. Although usually going to a fatal termination, the disease is sometimes arrested, and appears to be quite conquered, particularly in its earlier stages. In most

cases it extends over several years. A. L. arises from disease of a portion of the spinal cord, viz.: the posterior columns and the posterior nerve roots, which become atrophied and indurated. The exciting causes are not well understood, but exposure to cold, over exertion, privation, intemperance, and mental anxiety have been suggested as probable. It is sometimes hereditary, and is more common among males than females. It is developed usually not till middle life, from the age of 30 to 50. Beyond alleviation of pain little can be done by medicine, though many remedies have been tried. Electricity has been recommended by eminent authorities. Perhaps the best course is to attend carefully to the general health and regimen.

ATBA'RA, or **BAHR-EL-ASWAD**. See **NILE**

ATCHAFALAY'A, a branch of the Mississippi at its delta. It forms so large an angle with the main river, that, after a course of only 130 m., it enters the gulf of Mexico, 120 m. to the w. of New Orleans. From the Red river, which enters the Mississippi just above its own point of departure, the A. had received so much driftwood, as formed at last a stationary raft 10 m. long, 220 yds. broad, and 18 ft. deep—an obstacle to navigation which the state of Louisiana required 4 years to remove.

ATCHAFALAY'A BAYOU, an outlet of Red river in Louisiana, connecting also with the Mississippi and flowing southward to the gulf of Mexico. It is about 225 m. long, and navigable for steamers.

ATCHEEN, or **ACHIN**, or **ACHEEN**, a region in the n. w. part of the island of Sumatra, once a powerful kingdom; area, 20,471 sq. m. The interior is mountainous, some of the mountains rising to a height of 11,000 ft. The natives rebelled in 1873, but the Dutch succeeded in subduing them in 1878 and in extending their administrative system over the district. The capital Atcheen is in the northern part and has a pop. of about 35,000. The pop. of the entire district in 1893 was estimated at 529,562.

ATCHEVEMENT is a term nearly equivalent to armorial bearings, and is often used when speaking of the arms of a deceased person as displayed at his funeral or elsewhere. In this sense it is more commonly used in its abbreviated form of hatchment (q. v.).

ATCHISON, a co. in n. e. Kansas on the Missouri border; 423 sq. m.; pop. '90, 26,758. Agriculture is the main occupation. The central branch of the Union Pacific railroad intersects. Co. seat, Atchison.

ATCHISON, a co. in n. w. Missouri between the Missouri and Nodaway rivers; crossed by the Kansas City, St. Joseph and Council Bluffs railroad; 560 sq. m.; pop. '90, 15,533. Agriculture is the chief business. Co. seat, Rockport.

ATCHISON, a city and co. seat of Atchison co., Kan.; on the Missouri river and the Missouri Pacific, the Chicago, Rock Island, and Pacific, the Atchison, Topeka, and Santa Fé, and the Burlington Route railways; 33 miles n. by w. of Leavenworth. Its exceptional facilities by rail and water for commercial traffic have given it a rapid and substantial growth, and made it an emporium of much importance. The wholesale trade amounts to more than \$50,000,000 per annum, and its lumber, grain, grocery, and drug interests are conspicuous among its industries. Manufacturing is well advanced, especially in the lines of architectural iron and wood work. The city has gas and electric plants, electric railways, improved sewer and water services, paved streets, public parks, and a notable bridge across the Missouri river. There are churches of the leading denominations, public library, public high and graded schools, the Atchison Latin School, Midland College (Lutheran), St. Benedict's College (Roman Catholic), business college, the State Soldiers' Orphans' Home. Union depot, national banks, and daily, weekly, and monthly periodicals. Pop. '90, 13,963.

ATCHISON, **DAVID R.**, 1807-86, b. in Ky. He was in the Missouri legislature in 1834, and a county judge in 1841, but was soon chosen to the U. S. senate, where he at first opposed, and finally advocated, the right to hold slaves in the territories. He advocated the repeal of the Missouri compromise, and became the especial champion of those who were determined to force slavery into Kansas. He was for several sessions president *pro tem.* of the senate, and by virtue of his office was president of the U. S. during Sunday, March 4, 1849, as Gen. Taylor was not sworn into office till the following day. He d. 1886.

ATÉ, according to Homer, the daughter of Jupiter—or of Eris, as Hesiod says—was a vengeful goddess, ever attending *dysnomia*, or transgression of law, though she herself prompted men to such. She was banished from Olympus by Jove, whom she had incited to take an oath of which he subsequently repented. She then traveled to and fro over the earth with great rapidity, always intent on exercising a pernicious influence on mankind. But her steps were followed by the goddesses *Litai* (prayers), benevolent daughters of Jove, who healed those who had been afflicted by A. The tragic writers describe A. as the goddess of retribution. Their representations almost identify her with **NEMESIS** and **ERINNYs**.

ATELES (Gr. incomplete), a genus of American monkeys, of the division with long prehensile tails, to which the name **SAPAJOU** (q. v.) is sometimes collectively applied. In the genus A., the head is round, and the facial angle about 60°; the limbs are

remarkably long and slender, upon which account the English name SPIDER MONKEY (q. v.) is sometimes used as a generic designation; and the forelimbs are either entirely destitute of a thumb, or have a mere rudimentary one, a peculiarity in allusion to which the name A. was given. The name coaita or quata is frequently given to some of the species of A., but is sometimes limited to *A. paniscus*, as spider monkey sometimes is to *A. arachnoides*. One of the best known species is the marimonda (*A. belzebul*), a common monkey of Guiana, and which occurs in immense numbers on the banks of the Orinoco.

ATELIERS NATIONAUX, or NATIONAL WORKSHOPS, a term under which such institutions became renowned in connection with the French revolution of 1848. In almost all countries and ages, there have been projects for organizing labor under public authority, designed generally for the benevolent purpose of obviating the distress caused by casual depressions in trade. However distinctly the laws of political economy were laid down on the point, it could always be said that these were merely theoretic, and therefore this one instance of practical experiment, however calamitous in its day, left behind it a valuable lesson. The principles of political economy on this matter are that competition only can fix the extent to which labor is required in any department, and the rate at which it must be remunerated; that it is this competition which gives the workman a stimulus to labor effectively and profitably; and that if this stimulus were withdrawn, and all were paid alike, whether they worked well or ill, all would work ill, the public would be losers, and the large fund out of which laborers are supported under the competitive system would cease to exist. Immediately on the formation of the provisional government in Feb., 1848, a permanent department was established, called *The Committee of the Government for the Workmen*. This establishment acted on the doctrine that all workmen were entitled to have a living provided for them on a certain uniform scale. They did not forcibly abolish private employment, but they held out inducements which made workmen leave and employers break up the existing establishments. Consequently, nearly all the Parisian workmen threw themselves on the government, and others flocked in from other quarters in alarming numbers. It was found that these crowds of men, who claimed the privilege of employment by the state, had very little idea of the duty of working, even were there distinct employment for them. But when the body had increased to considerably above a hundred thousand, the government found that they had this ever-increasing mass to feed, and nothing to feed them with, since trade thus meddled with was in reality ruined. It was consequently found necessary to put an end to the system, and the result was the bloody battle of Paris, which brought about the restoration of despotism. One incidental experiment will perhaps best explain the ruinous tendency of the whole system. In the Hôtel Clichy, 1500 tailors were assembled to make uniforms for the new *garde mobile*. The men were to receive among them for the completed work as much as an army-contractor would have demanded. In the meantime they were paid two francs a day of subsistence money; the rest was to be divided among them at the end. The men were buoyed up with the notion that they were to receive not only their own proper wages, but the indefinite and enormous sum which they supposed to form the profit of the contractor, forgetting that such profit seldom exceeds about three per cent. Their disappointment was great when they found nothing to divide. There was, in fact, a loss. When paid their two francs—not much more than half what they obtained when employed by a contractor—they were paid more than the value of their labor and the profit of the transaction to boot. The reason is pretty obvious. Each man working for himself, and paid for his work on the competitive system, exerted himself; but when one man's exertions went virtually for nothing, unless he got the 1499 others to exert themselves to the same amount, all were alike lazy.

ATELLANÆ, *Fabulæ Atellanæ* (also styled *Ludi Oscî*), a kind of popular drama in Rome, first introduced from Atella, a t. in Campania, between Capua and Naples. After the Greek drama had been brought to Rome by Livius Andronicus, the old *Fabulæ Atellanæ* were still retained as interludes and after-pieces. They are not to be confounded with the Greek satiric drama, although the character of both was to some extent the same. In the latter, satyrs figured; while the former personated real Oscan characters. The *Macchus* and *Bucco* of the *Fabulæ Atellanæ* may be considered the origin of the modern Italian arlecchino (harlequin), and other characters of the same stamp. They were the favorite characters; spoke the Oscan dialect, and excited laughter by its quaint old-fashioned words and phrases. The A. were neither so dignified as the *comœdia prætextata*, nor so low as the *comœdia tabernaria*, but indulged in a kind of genial and decent drollery. The caricature was at first always pleasant, and, though quizzical, it did not lapse into obscenity, like the *mimi*. Respectable Roman youths, who could not appear as actors in the regular Greek drama without losing *caste*, were allowed to take part in the A. A few fragments in these popular farces have been collected by Bothe in his *Poetarum Latinorum Scenicorum Fragmenta* (Leip., 1834). See also Munk, *De Fabulis Atellanis* (Leip., 1840).

A TEMPO (Ital.), in time. A term used to denote that, after some short relaxation in the time, the performer must return to the original degree of movement.

A TEMPO GIUSTO (Ital.), in correct time. A term used to denote that, after a recitative, the performer should keep the music true and correct, which, during the recitative, had been altered to suit the action and passion of the scene.

A TESHGA (the place of fire), a spot on the peninsula of Apsheron, on the w. coast of the Caspian sea. It is considered sacred by the Guebres, or Persian fire-worshippers, who visit it in large numbers, and bow before the holy flames which issue from the bituminous soil. It is about a mile in diameter, and from its center, in clear dry weather, creeps forth a blue flame (caused by the ignition of the naphtha), which shines with great brightness by night.

ATESSA, a t. of south Italy, in the province of Chieti, and 23 m. s.s.e. from Chieti. It has a beautiful collegiate church, and several other churches and convents. Pop. 5200.

ATH, or **AATH**, a strongly fortified t. in the province of Hainault, Belgium, situated on the Dender, in lat. 50° 36' n., long. 3° 46' e. It has an arsenal, hospital, and college, and important manufactures of linen, calicoes, lace, gloves, cutlery, large hammers, etc., and carries on a brisk trade. Pop. 8260. The ancient church of St. Julien in A. is noted for its extraordinarily high tower.

ATHABASCA, a river and lake in the n.w. of America, forming part of the great basin of the Mackenzie, and lying, therefore, in the n.w. territory of the Canadian dominion. The river rises in the Rocky mountains near Mt. Brown, the highest point in the range. Its actual source is the small lake, already mentioned under the head of AMERICA as the Committee's Punch Bowl, which sends its tribute at once through the A. to the Frozen ocean, and through the Columbia to the Pacific. Its general course is n.e., till, after passing through A. lake, or rather crossing its w. end, it turns towards the n.w., and after a course of 30 or 40 m., unites with the Peace river, from beyond the Rocky mountains, to form the Slave river, which, again, after passing through Great Slave lake, takes the name of the Mackenzie.—*Lake A.* receives nearly all its waters from the A. river, and is probably unique in this, that its principal feeder traverses not its length but its breadth, and that not in its middle, but at its extremity. The lake's single outlet is the river A. The lat. is about 59° n., and the long. between 102° and 116° w., the length 230 m., and the average width 20.

ATHABASCA, district in Canada, formed in 1882 out of the Northwest Territory, containing abt. 106,000 sq.m. It is bounded on the n. and e. by the Northwest Territory (the Slave river forming, mainly, its boundary), on the s. by Alberta, on the w. by British Columbia. The famous Peace river district is in A. Principal places, Dunnegan, Vermilion, Peace river, Athabasca, forts Macleod and Lesser Slave. Cap., Regina, in Assiniboia district.

ATHABASCAS, Indians of British North America along the Arctic ocean and from Hudson's bay westward to the Pacific. There are several tribes, of whom the best known are the Umpquas, the Tines, the Dog Ribs, and the Beavers. It is thought that there are from 30,000 to 33,000 of them. They are peaceable and to some extent industrious. There are other A. Indians on the Mexican border from Texas to California, among them the savage and warlike Apaches, and their opposites, the quiet Navajoes and the Lipans. They say that their ancestors came from the west over seas and islands of snow and ice; possibly a tradition of a Tartar origin. They are larger and have more beard than other Indians.

ATHA-BEN-HAKEM, or **ALHAKEM-IBN-ATTA**. See **MOHAMMEDAN SECTS**.

ATHALIAH, the daughter of Ahab, king of Israel, married Jehoram, king of Judah, who d. 885 B.C. After the death of her son Ahaziah, who succeeded him, but reigned for only one year, she paved her own way to the throne by putting to death (as she supposed) all the seed-royal. "But Jehosheba, the daughter of king Jehoram, sister of Ahaziah, took Joash, the son of Ahaziah, and stole him from among the king's sons, who were slain." The young prince thus rescued was privately educated in the temple, and, after A. had reigned six years, the high-priest Jehoiada placed Joash on the throne (878 B.C.). A., hearing the noise attending the coronation, hastened to the temple, where the people were shouting, "God save the king!" As she looked round in astonishment on the young king, whom she had supposed to be dead, surrounded by priests, Levites, rulers, captains, and a rejoicing multitude, she "rent her clothes, and cried, 'Treason! treason!'" By the command of the high-priest, she was led out of the temple, and slain in the gateway of the palace. The house of Baal, with its altars and images, was broken down. This narrative (2 Kings xi.; 2 Chron. xxi. 6, xxii. 10-12, xxiii.) is the subject of Racine's drama, *Athalie*.

ATHA NARIC, a king of the western Goths, whose settlements lay on the n. bank of the lower Danube, in the 4th century. Having taken advantage of the weakness of the Roman empire when the imperial armies were engaged in suppressing the rebellion of Procopius, war was declared against him by the emperor Valens. A. acted strictly on the defensive during two campaigns, in which the Romans gained no advantage over him; but in the third year of the war (369 A.D.), he hazarded a general battle, and was defeated, whereupon he sued for peace, and, with that object, had a conference with Valens in a boat on the Danube. Peace was concluded, and A. had his attention occupied in settling dissensions arising out of the Arian controversy which then agitated his people, when

the first advance of the Huns on Europe alarmed the Gothic nation. A. attempted to secure the eastern borders of his kingdom; but the Huns forced the passages of the Dnieper, defeated the Goths, and advanced in great force into the plains of Dacia. When, in 374, the western Goths were received by the Romans as allies, and had settlements granted them on the s. of the Danube, A., with a part of his people, refused to accompany them, removing to the west, and fortifying himself against the new enemy. In 380, however, he was obliged to retire, when he accepted the hospitality of the empire, and removed to Constantinople, where he met with a cordial and honorable reception by the emperor Theodosius. At this time died Fritigern, the king of the Goths that had settled on the s. of the Danube; and A. being made king of the whole western Gothic nation, concluded a treaty of peace, in behalf of the whole, which had the effect of incorporating that people with the other subjects of the empire. He d. at Constantinople in 381.

ATHANASIAN CREED, the third of the three ecumenical symbols, derived its name from its composition being attributed to Athanasius; it is also known, from its initial words in Latin, as the creed *Quicumque Vult*. The first part of this creed contains a detailed exposition of the Trinity; the second, the doctrine of the incarnation. Modern criticism has called in question the title of Athanasius to be considered the author of this creed. It was known as early as the beginning of the 6th c., but not under its present name. It is spoken of as "Athanasius's Tract on the Trinity," in some articles of the middle of the 8th c., and is supposed to be alluded to, "as the faith of the holy prelate Athanasius, in the council of Autun, about 670. Athanasius himself makes no mention of this creed, although its doctrines are essentially his; nor do any of the church fathers. Other two circumstances speak against its authenticity: it is in Latin, and Athanasius wrote in Greek; the expressions, again, are different from those used by Athanasius in speaking of the same things. By Protestants, therefore, and even by most Catholics, its Athanasian origin has been given up, and its production has been assigned with most probability to the 5th c., and to Gaul; Hilary, archbishop of Arles (about 430), being conjectured to be the author. The title of Athanasian probably became attached to it during the Arian controversy in Gaul, as being an exposition of the system of doctrine which was opposed to the Arian system, and which would naturally be called Athanasian from its chief propounder. It was received into the public offices of the Gallic church in the 7th c., and by the middle of the 10th c. it was adopted at Rome and all over the west. In Britain, it was probably in use as early as 800. The Greek church was late in receiving it, and even then not without altering the article concerning the "Procession of the Holy Ghost." The reformers adhered to the A. C., and Luther called it "a bulwark of the apostles' creed." Even those churches that do not in any way acknowledge it as a symbol (as the Presbyterian churches of Britain and America, as well as the independents) generally accept its doctrines.

The A. C. is the most rigid and intolerant of the three Catholic symbols, and has given rise to much controversy; and though still generally received by Protestants as well as Catholics, the regard once had for it has declined. The points in this creed that give offense to some are defended by others, on the plea that it was not drawn up for the sake of gratuitously dogmatizing on abstruse speculative truths, but to counteract other dogmas which were held to be dangerously heretical. Waterland, in his *Critical History of the Athanasian Creed*, says: "The use of it will hardly be thought superfluous so long as there are any Arians, Photinians, Sabellians, Macedonians, Apollinarians, Nestorians, or Eutychians in these parts." (See articles under these heads.) With respect to what are called the "damnatory clauses" (the clauses, namely: "Which faith except every one do keep whole and undefiled, without doubt he shall perish everlastingly;" and: "This is the Catholic faith, which except a man believe faithfully, he cannot be saved"), the churches which adopt the creed do not mean by them to imprecate curses, but to declare, as a logical sequence of a true faith being necessary to salvation, that those who do not hold the true faith are in danger of perishing; as it is said, Mark xvi. 16, "He that believeth not shall be damned." These clauses are also held to apply to those who deny the substance of the Christian religion, and not infallibly to every person who may be in error as to any one particular article. A rubric to this effect was drawn up by the commissioners appointed in 1689 for the review of the English common prayer-book, but none of their suggestions took effect. Compare also the 18th article of the church of England with these clauses.

ATHANASIUS, primate of Egypt, was b. in Alexandria about the year 296 A.D. There are no particulars on record of his lineage or his parents. Alexander, then officiating as primate or patriarch of Alexandria, brought him up in his own family, and superintended his education, with the view of his entering on the Christian ministry. In his youth, he often visited the celebrated hermit St. Antony, and embraced for a time the ascetic life with the venerable recluse. He was but a youth and only a deacon when appointed a member of the first general council at Nice, in which he distinguished himself by his erudition and his eloquence.

His patron, Alexander, having died in the following year, he was duly elected to the primacy by the clergy and people; and was but newly installed in his office, when Arius, who had been banished at the time of the condemnation of his doctrine at Nice, was recalled, and made a recantation of his erroneous principles. A., it is said, refused

on this occasion to comply with the will of the emperor that the heretic should be restored to communion. On this account, and in consequence of several other charges brought against him by the Arian party, he was summoned by the emperor Constantine to appear before the synod of Tyre, in 335 A.D., which deposed him from his office. His sentence was confirmed by the synod of Jerusalem in the following year, when he was banished to Treves. In 338, Constantius, now emperor of the east, though unfriendly to the principles of the Trinitarians, recalled A. from his banishment, and restored him to the primacy at Alexandria. His entrance into the city was like a triumphal procession; but the Arians soon rose against him, and (in 341) he was again condemned by a council of 90 Arian bishops assembled at Antioch. Against this decision a protest was made by 100 orthodox bishops at Alexandria; and in a council held at Sardis, 300 bishops, with Julius, bishop of Rome, at their head, confirmed the decision in favor of A., who was again replaced in his office (349 A.D.). The Arians once more acquired the ascendancy after Constantius (in 353) had been made emperor of both the east and the west; for in that year A. was condemned by a council held at Arles, and the sentence was confirmed by another held at Milan in 355, the influence of the sovereign being strongly exerted to secure his condemnation. As the resolute patriarch had declared that he would not leave his place without an express order from the emperor, violent means were resorted to for his expulsion. While engaged in conducting divine service, he was interrupted by a company of soldiers, from whom he made his escape into the Egyptian desert. A price was set on his head; and to avoid his persecutors, he retired from the usual haunts of the anchorites to a remote desert in upper Egypt, where he was attended by one faithful follower. Here he wrote several works to confirm orthodox Christians in their faith. On the accession of Julian to the imperial throne, toleration was proclaimed to all religions, and A. returned to his former position as patriarch of Alexandria (361 A.D.). His next controversy was with the heathen subjects of Julian, to whom the patriarch, by his zeal in opposing their religion, had made himself very offensive. To save his life he was compelled again to flee from Alexandria, and remained concealed in the Theban desert until 363, when Jovian ascended the throne. After holding office again as patriarch for only a short space of time, he was expelled anew by the Arians, under the emperor Valens. A. now found refuge in the tomb of his father, where he remained hidden four months, until Valens, moved by petitions from the orthodox Alexandrians, restored the patriarch to his see, in which he continued till his death in 373 A.D.

A. was the leading ecclesiastic in the most trying period of the history of the early Christian church. His ability, his conscientiousness, his judiciousness and wisdom, his fearlessness in the storms of opposition, his activity and patience, all mark him out as an ornament of the age, as well as the most influential public character in matters of religion. Though twenty years of his life were spent either in exile or what was equivalent to it, yet his prudence and steadfastness, combined with the support of a large party, crowned his exertions with complete success. He was a clear thinker, and as a speaker was distinguished for extemporaneous precision, force, and persuasiveness.

His writings are polemical, historical, and moral; all marked by a style simple, cogent, and clear. The polemical works treat chiefly of the doctrines of the Trinity, the incarnation of our Savior, and the divinity of the Holy Spirit.

The earliest edition of the collected works of A. in the original Greek appeared in two volumes, folio, at Heidelberg, in 1600. It was accompanied with a Latin translation. The most complete edition is that published at Padua in 1777. A.'s four orations against the Arians, and his oration against the Gentiles, were translated by S. Parker (Oxford, 1713); also his treatise on the incarnation of the word was translated by W. Whiston, forming part of that gentleman's *Collection of Ancient Monuments Relating to the Trinity and Incarnation*, London, in 1713. The epistles of A. in defense of the Nicene creed, and on the councils of Ariminum and Seleucia, together with his first oration against the Arians, were translated, with notes, by the Rev. John Henry Newman, Oxford, (1842).

ATHEISM, a word of modern formation, from Gr. *atheos*, "without God," signifies the doctrine of those who deny the existence of a God. The term atheist conveys such terrible associations to almost all minds, that there is perhaps no reproach from which men shrink more; and yet it has been freely applied by the zealous of all ages to those whose notions of the invisible powers differed from their own. The imputation is the most damaging that can be made, and it requires only a little ingenuity to make out a case of *constructive* A. from any set of opinions at all differing from the common. Thus, the ancient Greeks accused some of their philosophers of A. though they did not deny the existence of a divinity, but only rejected the common notions of a plurality of gods. And in the Christian church, after the doctrine of the Trinity had been fixed and defined, those that denied the divinity of Christ were not unusually branded as atheists.

The horror inspired by this name is strikingly shown in the way it is repudiated by the adherents of pantheism (q. v.), who reject a personal god, and substitute the idealized principle of order that pervades the universe. It is hardly to be denied, however, that the idea associated with the word God has hitherto involved personality as its very essence; and, except for the purpose of avoiding odium, there could be little propriety in retaining the word when the notion is so completely altered.

The view of those who, like Kant, believe it impossible to *demonstrate* satisfactorily the existence of God, though it must be held on other grounds, is called *speculative A.*, in opposition to the *dogmatic A.* of those who attempt to disprove that existence.

ATHELNEY, ISLE OF, a marsh at the junction of the rivers Tone and Parret, in the middle of Somersetshire. Here Alfred, when driven from his throne, hid from his enemies, and founded, in 888, a Benedictine abbey, now entirely gone. Among the many relics found in this spot is a ring of Alfred's preserved in the Oxford museum. The name Athelney means "island of the nobles," or "royal island."

ATHELSTAN, the grandson of Alfred the Great, was b. about 895 A.D., and was the first Saxon monarch who took the title of king of England, Alfred himself only assuming that of king of the Anglo-Saxons. He was crowned at Kingston-upon-Thames, in 925, and seems to have possessed both great ambition and high talent. It is supposed that his design was to unite in subjection to his single sway the entire island of Britain. His resources, however, were not equal to the undertaking, and he had to content himself with the acquisition of portions of Cornwall and Wales. On the death of Sigtric, king of Northumbria, who had married one of his daughters, A. took possession of his dominions. This excited the alarm and animosity of the neighboring states, and a league, composed of Welsh, Scotch, and Irish, was formed against the English king, for the purpose of placing Aulaff, the son of Sigtric, on his father's throne. A fierce and decisive battle was fought at Brunenburgh, in which the allies were utterly defeated, and which became famous in Saxon song. After this, the reputation of A. spread into the continent. His sisters were married into the royal families of France and Germany, and he himself enjoyed the greatest influence and consideration. At home, he exhibited a deep interest in the welfare of his people, improved the laws, built monasteries, and encouraged the translation of the Bible into the vernacular. He d. at Gloucester, on the 25th Oct., 941, in his 47th year.

ATHENA. See MINERVA.

ATHENÆUM (Gr. *Athenaion*), the temple of Minerva (Gr. *Athene*) at Athens, which was frequented by poets, learned men, and rhetoricians, who there read aloud their works.—The A. in Rome was a school or college erected, by the emperor Hadrian, for the study of poetry and rhetoric, with a regular staff of professors. It existed for a long period. In the time of Theodosius II., it had three professors of oratory, ten of grammar, five of sophistry or dialectics, one of philosophy, and two of jurisprudence.—In modern times, the name A. has been revived as an appellation for certain literary institutions, and also as a collective title for literary essays and reviews. A. is the title of two weekly journals of literature, science, and art—one published in London, the other in Paris.

ATHENÆUS, a Greek *rhetor* and *littérateur*, b. at Naucratis in Egypt. He lived at the close of the 2d and beginning of the 3d century. His work, entitled *Deipnosophiste* (Banquet of the Learned), in fifteen books, but of which we possess the first two, and parts of the third, eleventh, and fifteenth only in an abridged form, is very interesting, as it has preserved for us copious fragments of old writers, and treats, in the form of dialogue, of almost all the topics of ancient Greek manners, private and public life, arts, sciences, etc. It is not a work indicative of any high ability; the author, for the most part, appears in the character of an agreeable, well-read, epicurean gentleman, excessively fond of *tit-bits*, both of scandal and cookery. He tells many stories to the disadvantage of people whom history praises; but these we are by no means bound to believe, nor, indeed, is he a man whose opinions are worth much on any subject; but as a melange of literary, social, and domestic gossip, the value of the work is unrivaled. A. appears to have read enormously; he states that he had made extracts himself from 800 plays of the middle comedy alone. But his dialogue is prolix and lumbering; and his work is not irradiated by a single gleam of genius, and has only achieved immortality through being a store-house of miscellaneous information, that otherwise would have been lost to the race. The best editions are by Schweighäuser (14 vols., Strasb., 1801–7), and Dindorf (3 vols., Leip., 1827). There is an English translation of A. in "Bohn's Classical Library," (3 vols., Lond., 1854).

ATHENAGORAS, an early Christian philosopher, who taught first at Athens, and afterwards at Alexandria. He is one of the oldest of the apologetical writers, and is favorably known by his *Legatio pro Christianis*, which he addressed to the emperor Marcus Aurelius, in the year 177 A.D. He therein defended the Christians against the monstrous accusations of the heathen, viz.: that they were guilty of atheism, incest, and cannibalism. His work is written in a philosophical spirit, and is marked by great clearness and cogency of style. We likewise possess a valuable treatise of his on the resurrection of the dead.

ATHENAIS, an Athenian of distinguished beauty, the daughter of Leontinos the Sophist, was b. about the close of the 4th c. A.D. She received from her father a superior education, being skilled in Greek and Latin literature, rhetoric, astronomy, geometry, and the science of arithmetic. After his death, she repaired to Constantinople, to obtain justice for the harsh treatment to which her brother subjected her. Here her beauty and intelligence made her the favorite of Augusta Pulcheria, sister of Theodosius II., who considered that she would make an excellent wife for the emperor. In

431, A. having been baptized and named Eudocia, was married to Theodosius, and in 488, made a splendid pilgrimage to Jerusalem, bringing with her, on her return, the supposed relics of the first martyr, Stephen. Afterwards, she lost the favor of Pulcheria—the real manager of affairs—and was banished from the court. She then retired to Jerusalem, where she suffered many persecutions, and d., in the odor of sanctity, 460 A.D. A. wrote an epic poem on the war of Theodosius against the Persians, and several other metrical works which have not been preserved.

ATHENODORUS, surnamed **CANANITES**, or **SANDONUS**, a stoic philosopher, who probably gave instruction to Augustus when he was at Apollonia, and who was made tutor to Tiberius, who esteemed him highly for virtue and probity. He was in the habit of giving his opinions freely, and often warned Augustus that when he found himself giving way to anger he should repeat the letters of the alphabet. He d. in Targus, his native t., aged 82. None of his works have survived. Another A., surnamed **CORDILION**, was librarian at Pergamus, and d. in Rome. There were also two sculptors of the name, one of whom assisted Agesander in the group of the "Laocoön."

ATHENS, the capital of the ancient state of Attica, is said to have been founded by Cecrops, about 1550 B.C., and styled Cecropia; but even the ancients themselves doubted this tradition. Equally uncertain is the story that it was first styled A. in honor of Athene, during the reign of Erichthonius. The ancient citadel was situated on the top of a square craggy rock, 150 ft. high, with a flat summit, 1000 ft. long, and 500 broad. Gradually, as population increased, A. extended itself over the wide and beautiful plain below. This increase is said to have been occasioned by the organization of the 12 Attic tribes into a political confederacy or union by Theseus, the brightest figure that shines through the "dark ages" of Attic history. The position of A. near the gulf of Saronica, opposite the eastern coast of the Peloponnesus, was favorable to the acquirement of naval power. The city, which was distant 4 or 5 m. from the sea, possessed three harbors, all situated on the s.w., and connected with it by walls. The oldest of these harbors was Phalerum. It was also the nearest to the city, and accessible at all times by a dry road. The Piræus was first used as a harbor by Themistocles. Munychia was the acropolis of the whole rocky peninsula termed the Peiræus, and of immense importance strategically. The two last harbors were connected with the city by the famous "long walls," of which we read so much in Athenian history. They were 40 stadia, or nearly 5 m., in length. Two streams flowed in the vicinity of A.; on the e. side, the Ilissus, which also washed the southern part of the city; and on the w., the Cephissus, about a mile and a half beyond the walls. To the w. lay Salamis, with Eleusis on the n.w., Phylæ and Decælea on the n., Marathon on the n.e., and Hymettus on the s. All along the coast rose splendid buildings.

The whole of the magnificent prospect was crowned by the acropolis, filled with monuments. See illustration, GREECE, vol. VII. First rose the parthenon (q.v.), or temple of Minerva, a pile which even now, after the lapse of centuries, remains among the wonders of the world. The propylæa, all built of white marble, formed the entrance to the parthenon. Close to it, on the n. side of the acropolis, rose the erechtheum, the most venerated of all Athenian sanctuaries, and connected with the oldest religious history of the city. The whole of it was destroyed by the Persians, but was restored during the Peloponnesian war. Its ruins still exist, and allow us to form a very correct idea of its external form and structure. In some points, it differed from all other examples of Greek temples. But it would be tedious and unprofitable to mention in detail all those magnificent buildings which were the glory of ancient Athens. It is sufficient to say that gods were never more superbly honored in any land. That enthusiastic love of the beautiful which animated the Athenians, turning their religion into an art, and making worship an education in aesthetics, is nowhere so clearly visible as in their religious architecture. Their mythological faith stood daily before their eyes in monumental splendor, for almost every deity had his temple or shrine in the city. Two of the finest buildings—the temple of Theseus, and that of Jupiter Olympus—were on the outside of the city; the first to the n.w., the second to the s. The former was both a temple and a tomb, inasmuch as it held the remains of Theseus himself. It was built about 465 B.C., and was therefore older than the parthenon. It had the privilege of an asylum for slaves, and the large space of ground which it inclosed was frequently used as a muster-ground for the Athenian soldiery. It was built of the favorite Pentelic marble, in the doric style of architecture, and is the best preserved of all the monuments of ancient Athens. For centuries it was a Christian church, appropriately enough dedicated to St. George, the chivalrous hero of the "dark ages" of Christianity, as Theseus had been of the "dark ages" of Attic history; but is now the national museum of the city. The temple of Jupiter, of which 16 grand Corinthian columns are still extant, to the s.e. of the acropolis, and near the right bank of the Ilissus, in size, splendor, and beauty excelled all other Athenian structures. Immense sums of money were expended upon it from the time when it was commenced by Peisistratus, until it was completed by Hadrian, a period of 700 years. The building of it was frequently suspended, so that Philostratus calls it "a struggle with time." At the time the Persians sacked the city, it was fortunately only beginning to be built, and so escaped destruction. Aristotle speaks of it as a work of despotic grandeur, and

equal to the pyramids of Egypt. The exterior was decorated by about 120 fluted columns, 61 ft. in height, and more than 6 ft. in diameter. It was 354 ft. long, and 171 broad, and contained the celebrated statue of the Olympian Jupiter in ivory and gold, the work of Phidias.

Besides these wonders of art, the city contained places of interest of which the memory will perpetually remain—the academy where Plato, whose estate lay near it, gave his lessons in a grove of plane-trees adorned with statues; tradition alleged it to have belonged originally to Academus. Hipparchus surrounded it with a wall, and Cimon adorned it with walks, fountains, and olive-groves. The lyceum, the most important of the Athenian gymnasia, where Aristotle lectured; and, near to this, the cynosarges, where Antisthenes the Cynic expounded his “harsh and crabbed” doctrine; the hill of the areopagus, where the most venerable court of judicature was held; and the prytaneum, or senate-house. About a quarter of a mile to the w. of the acropolis rises a low hill, which marks the locality of the pnyx, a place of public assembly, forming a large semicircular area, bounded at the base by a limestone wall, from which projects a pedestal, carved out of the rock, and ascended by steps. This most interesting place has been preserved almost in its integrity, and, as we look around, we are carried back to the times when some 6000 Athenian citizens were here assembled, when the orator, standing upon the pedestal, could survey the acropolis, with all its temples, the venerable areopagus, and beyond the city the extended plains and villages of Attica, with corn-fields, olive-grounds, and vineyards.

A., in its most flourishing period, numbered 21,000 free citizens; from which we may calculate that it contained about 200,000 inhabitants. More than 2000 years have passed over the beautiful city, and still its remains excite the admiration of the world. The Turks surrounded it with wide irregular walls, partly built out of the ruins of the old walls, and containing many fragments of noble columns. Of the propylea, the right wing, or temple of victory, was destroyed in 1656 by the explosion of a powder magazine. Six columns, with lofty arches, remain to mark the site of the opposite wing. The interior of the parthenon was used for some time as a Turkish mosque. Eight columns remain on the e. of the front, several colonnades at the sides; and of the back pediment, where the combat of Minerva and Neptune was sculptured, nothing remains save the head of a sea-horse, and two decapitated female figures. Of the pediment in front, several figures belonging to the group representing the birth of Minerva are preserved in the British museum, and justly regarded as masterpieces of ancient sculpture. Of all the statues which the parthenon contained, only one, that of Hadrian, has been preserved. Ruined as it has been, the general aspect of the parthenon is still sublime. Of the erechtheum (or temple of Neptunus Erechtheus) considerable vestiges remain, especially the beautiful female figures styled caryatides.

The situations and vast extent of the two theaters may still be traced, though grain is now grown in the arenas. All these remains belong to the acropolis. In the city below, there are no such splendid memorials. The horologium, or octagonal temple of the winds (built by Andronicus Kyrresthes), has been well preserved; but a few fragments found in broken walls are all that remain to tell of the splendid gymnasium built by Ptolemæus. Beyond the city, the attention of the spectator is arrested by the sublime ruins of the temple of Jupiter Olympus. Pedestals and inscriptions have been found here and there, sometimes buried in the earth. The sculptures on the friezes of the interior of the temple of Theseus, representing the exploits of Theseus, have been well preserved, while the external sculptures are almost utterly destroyed. A Turkish burial-place now occupies the hill where the areopagus held its sittings. The site of the lyceum is indicated only by scattered stones, and a modern house and garden occupy the place of the academy. Scarcely anything remains to show the old magnificence of the harbors Piræus, Phaleros, and Munychia.

It is probable that, in the time of Pausanias, many structures remained belonging to the period before the Persian war, as Xerxes, during his short time of mastery over A., would scarcely have been able to destroy more than the fortifications and principal public buildings. Themistocles, in his restoration of the city, had chiefly a regard to utility; Cimon paid attention to its decoration; but Pericles far exceeded them in the magnificence of his designs, which were too vast to be carried into effect in later times. The civilization, spreading from A. as its center, raised Macedon and other states into dangerous rivalry. The defeat at Cheroneia was as fatal to the fine arts as to the liberty of the Athenians. After the works at the Peiræus had been destroyed by Sulla, the naval power, and with it the whole political importance of A., rapidly declined. It is true that the city was treated leniently by its conquerors; the temples and statues were preserved from violation, and A., with all the trophies of eight centuries of greatness, remained under the Antonines; but the free national spirit of the Athenians had departed forever, and slowly, but surely, the fine arts shared the fate of Grecian liberty. Their treasures, which had been spared by the Roman emperors, were gradually stolen away by various thievish collectors, especially for the decoration of Byzantium, or were destroyed by irreflective Christian zeal and barbarian invasion. About 420 A.D., the ancient religion and temple-service of A. had entirely disappeared; afterwards, the schools of philosophy were closed by Justinian, and Greek mythology was gradually forgotten. St. George took the place of Theseus, and the parthenon was converted into

a church. The surviving industry of A. was injured by Roger of Sicily, who removed its silk manufactures. In 1456, A. fell into the hands of Omar, and, to consummate its degradation, under the low, sensual Turks, the city of Athene was regarded as an appanage of the harem, and governed by a black eunuch. The Venetians, having captured the city in 1687, intended to carry away as a trophy the quadriga of victory from the w. front of the parthenon, but shattered it in their attempt to remove it. In 1688, A. was again delivered into the hands of the Turks, and the work of demolition now proceeded rapidly. The grand remains of antiquity were used as quarries to supply materials for all ordinary buildings, and, in the course of another century, the city was reduced to its lowest point of degradation.

Modern A. (styled by the Turks *Athina* or *Setines*) is now the capital of the new kingdom of Greece. Previous to the Greek revolution (1821), it was a provincial city of inferior importance, the seat of a Greek metropolitan bishop, and under the jurisdiction of the Turkish governor in Eubœa. In 1821, the war of liberation commenced, and the Turks surrendered Athens in the following year; but again captured it in 1826, and took the acropolis in 1827. After this it was left in ruins until 1830, when Attica was declared united with Greece by the protocol of the London conference. In 1834, Otho, the son of the Bavarian monarch, who had been elected to the sovereignty of the new kingdom, removed his residence from Nauplia to A. Improvements now proceeded rapidly: Turkish manners and customs disappeared; the contemptible wooden houses and crooked streets were superseded by new ones—among which the *Hermes*, *Æolus*, *Athene*, and *New Stadion* streets are conspicuous; and, in 1836, the foundation of a new palace was laid, and it was completed in 1843. The municipal affairs of A. are now regulated by a mayor (*demarchos*) and council elected by the citizens. Modern A. has a gymnasium, a library enriched with many donations from France and Germany, and a university, where about 52 professors and tutors are engaged. The number of students is about 1200. Several interesting works have been printed in A. The French and United States governments have founded archaeological institutes, and several missionary societies have branches here. A. has several printing establishments, soap-works, leather-works, and silk and cotton factories. It is connected with Piræus, its port, by rail. Pop. '89, 107,251.

Political History of A.—It was the Ionic race that manifested most signally the distinguishing characters of Greek civilization; and of this portion of Hællas, A., in the brilliant part of its history, stands out most prominently. According to tradition, its political power was first established by Theseus, king of Attica, who made A. the metropolis. Here he instituted the great popular festival of the Panathenæa, and, by encouraging settlements in the city, greatly increased its population. He divided the citizens into three classes: nobility, agriculturists, and mechanics. Until the death of Codrus in 1068 B.C., A. was governed by kings; afterwards, by archons elected from the nobility. The time of holding office was limited to 10 years in 752 B.C., and to 1 year in 683 B.C., when 9 archons were annually elected, one being called the *archon eponymus*, because the year was distinguished by his name. Here begins the authentic history of A. These archons, together with the council of nobles, afterwards called the areopagus, exercised the whole power of the state, and administered justice. The Athenian government was thus, like all other Hellenic governments, an oligarchy; but the changes introduced by the archon Solon, 594 B.C., though remarkably moderate, laid the foundation of that democratic constitution which was afterwards perfected by Cleisthenes. The condition of the population at the time of Solon was one of extreme suffering and discord, arising chiefly from the oppressive execution, by the aristocratic archons, of the law of debtor and creditor. This law was of old extremely harsh in Greece as well as in Rome; it assigned the debtor that could not fulfill his contract as the slave of his creditor. The great part of the soil of Attica was in the hands of the rich, and the mass of the population, who tilled the lands as tenants, were either in hopeless arrears, or already, with their families, actual slaves. Driven to desperation, the populace were ready to rise in mutiny; the oligarchy were afraid or unable to enforce the laws; and thus it was agreed to confer dictatorial power on Solon, well known for his wisdom, integrity, and sympathy with the people, and allow him to solve the problem. The disease being desperate, Solon applied the desperate remedy of abolishing existing contracts, liberating those that had been reduced to slavery, and forbidding for the future any one from pledging his own person or that of a member of his family. He next reformed the political constitution by dividing the freemen into four classes, according to the amount of their property. It was only the richer classes that paid taxes and were eligible to the offices of state; but all had votes in the assembly that elected the archons, and all sat in judgment on their past conduct, on the expiry of their year of office. The government, though still oligarchical, was thus modified by popular control. Its free operation was for some time (560–510 B.C.) interrupted by the usurpation of Peisistratus and his sons, whose *tyranny*, however, was mild and enlightened, the forms at least of the Solonian constitution being preserved.

On the banishment of the Peisistratidæ (510 B.C.), a further political reform was introduced by Cleisthenes, who extended the basis of the constitution, and rendered it essentially democratic. To Cleisthenes is ascribed the origin of the practice called *ostracism* (q.v.).

Then followed the brilliant period of the Persian war, when, out of the circumstances



ATHENS.—1. Temple of Theseus. 2. Portico of the Erechtheion.

which had seemed to threaten destruction. A. rose to the highest point of power and prosperity. Miltiades at Marathon, and Themistocles at Salamis, gained the victories which infused new courage and enthusiasm into the Greek nation. The period between the Persian war and the time of Alexander the great, or from 500 to 336 B.C., was the most glorious in Athenian history; and in 444, Cimon and Pericles raised the city to its highest point of grandeur and beauty. But under Pericles, the beginning of a decline took place, through the decay of ancient morals and the Peloponnesian war, which ended in the capture of A. by the Lacedæmonians. After this, A. retained only the shadow of its former power and dignity. The thirty appointed ministers of government were, in fact, so many tyrants, supported by the Lacedæmonian army. After eight months of despotism had been endured, the tyrants were expelled by Thrasybulus, a free constitution was restored to A., and a new period of prosperity commenced. But it was not destined to endure long; a formidable foe, Philip of Macedon, now appeared in the north. The Athenians having opposed him in the Phocian war, Philip took from them several of their colonies. Then followed the defeat of the Athenians at Chæroneia (338 B.C.), a fatal blow to Greece. A. with other states became subject to Macedon. The free spirit of the citizens was broken, and in moral character they degenerated. After Alexander's death, a fruitless attempt was made to regain their liberty. Antipater instituted an oligarchy of wealth. Soon afterwards, A. was taken by Cassander, and placed under the rule of Demetrius Phalereus, who employed his power wisely and beneficently. Once more the old constitution of A. was restored by Demetrius Poliorcetes, and a short interval of independence was enjoyed, until the city was taken by Antigonus Gonatas. After liberating themselves from the dominion of Macedon, and joining the Achaian confederacy, the Athenians were so misguided as to support Mithridates against the Romans. This last error was fatal. Sulla conquered A., destroyed the port of the Peiræus, and left only the appearance of liberty and independence, which entirely vanished in the time of Vespasian. Still, after the spirit of liberty and progress had departed, A. long remained safe from spoliation. The Romans, in their respect for Grecian pre-eminence in art and philosophy, and moved also by religious reverence, long regarded Athens as a captive too noble and beautiful to suffer any indignity.

ATHENS, a co. in s.e. Ohio, on the Ohio river; intersected by Hocking river; 485 sq.m.; pop. '90, 35,194. Co. seat, Athens.

ATHENS, city and co. seat of Clarke county, Ga., on the Oconee river, 70 miles e. by n. of Atlanta, and on the Central of Ga., the Ga., the Northeastern of Ga., and the seaboard Air Line railroads. The city has a delightful climate, the mean annual temperature being 60°; is an important cotton market, and contains several cotton factories, besides manufactures of iron, flour, furniture, etc. Here are situated the University of Georgia, founded in 1785, the Georgia State College of Agriculture and Mechanic Arts, organized in 1872, the Lucy Cobb Institute for girls, Knox Institute, Jernal Academy, a State normal school, and several daily, weekly, and monthly periodicals. Pop. '90, 8639.

ATHERINE, *Atherina*, a genus of small fishes, allied to the mullet family (*mulgillæ*), but latterly separated into a distinct family, *atherinidæ*. The atherines have more than twice as many vertebrae as the mullets; they are of a rather slender form; but few of them exceed 6 in. in length. They have a protractile mouth, and very small teeth; some are quite toothless. Almost all the known species, which are numerous, and found in the seas of different parts of the world, have a broad silvery band along each flank. Some of them are much esteemed for their delicacy. They all congregate in great shoals. They abound in the Mediterranean. One species, *A. presbyter*, is very common on the s. coast of England and on some parts of the coast of Ireland, but is rare on the e. coast of Britain. In the markets of some of the southern towns of England, where the smelt (q.v.) is unknown, it is sold under that name; in Brighton and some other places, it is called *sand smelt*. Where this fish abounds, it is often taken by anglers from the shore, biting readily at almost any bait.

ATHEROMA, or "fatty deposit," is generally found in the tissues of aged persons, or those who have lived dissipated and ill-nourished lives. In appearance, it is yellow and cheesy, showing under the microscope fatty granules and crystals of cholesterine. Its most common situation is between the middle and inner coats of arteries, and is dangerous, inasmuch as it interferes with the elasticity of the arterial tube, rendering it more liable to injury, and less able to repair itself, should any occur. A. generally precedes aneurism (q.v.). Cysts filled with contents resembling bread-sauce, which frequently occur in the scalp, are termed atheromatous tumors.

ATHERSTONE, a market t. of Warwickshire, England, on the borders of Leicestershire, 16 m. n.e. from Birmingham; in a valley surrounded by finely wooded hills, on the Roman road called Watling street, the Trent Valley railway, and the Coventry and Fazely canal. The town is irregularly built; many of the houses are very ancient; the old houses are of stone, the modern ones of brick. Some of the modern churches and other public buildings are handsome structures. Hats, stockings, and ribbons are manufactured here.

ATHERTON, CHARLES GORDON, 1804-53; b. N. H., senator of the United States from New Hampshire. He was a member of the lower house of congress, where, Dec. 11, 1838, he introduced what gave him the cognomen of "gag-rule Atherton." It was a

resolution to lay on the table, without reading or reference, any petition touching the subject of slavery. A.'s resolution passed by 120 votes to 78, and for several years all such petitions were treated with entire silence. A. was chosen to the senate in 1842, and again in 1852.

ATHIAS, JOSEPH, a printer of Amsterdam, who printed two editions of the Old Testament in Hebrew, remarkably accurate, and the first edition in which the verses were numbered in figures. For this and other meritorious works, the states-general gave him a gold medal.

ATHLETE (Gr. *athleo*, to contend), the name given to a combatant, pugilist, wrestler, or runner, in ancient Greece. Athletics were studied in Greece as a branch of art, and led to several useful rules of diet, exercise, etc., applicable to ordinary modes of life. Bodily strength and activity were so highly honored by the Greeks, that the A. held a position in society totally different from that of the modern pugilist. When he proposed to enter the lists at the Olympic or other public games, he was examined with regard to his birth, social position, and moral character. A herald then stepped forth and called upon any one, if he knew aught disgraceful to the candidate, to state it. Even men of genius contended for the palm in athletic exercises. Chrysippus and Cleanthes, the famous philosophers, were victorious athletes, or, at least, *agonistæ*, i.e., persons who pursued gymnastic exercises, not as a profession, but for the sake of exercise, just as at the present day we have gentlemen-cricketers, amateur-pugilists, etc. The profound and eloquent Plato appeared among the wrestlers in the Isthmian games at Corinth, and also in the Pythian games at Sicily. Even the meditative Pythagoras is said to have gained a prize at Elis, and gave instructions for athletic training to Eurymenes, who afterwards gained a prize at the same place. So great was the honor of an Olympian victor, that his native city was regarded as ennobled by his success, and he himself considered sacred. He entered the city through a special breach made in the walls; he was supported at the public expense; and when he died, was honored with a public funeral. Euthymus, of Locri in Italy, who had, with only one exception, been regularly victorious at Elis, was honored with a statue, to which, even during his lifetime, homage was paid by command of an oracle. Athletic sports were first witnessed at Rome 186 B.C. They were introduced by M. Fulvius at the end of the Ætolian war, and became excessively popular in the time of the emperors. At Rome, the athletes formed a corporation.

ATHLONE, a small t. in the center of Ireland, on both sides of the Shannon, chiefly in the co. of Westmeath, but partly in that of Roscommon. It is the largest town between Dublin and Galway, and lies on a commanding situation, 3 m. below Lough Ree, in a carboniferous limestone district. The chief manufactures are felt hats, friezes, linens, and stays. A canal here, a mile long, enables large river-steamers to navigate the Shannon for 116 m., from Killaloe to Carrick-on-Shannon, uninterrupted by the river-rapids. The Shannon is crossed by a fine bow-string and lattice iron bridge of two arches, 175 and 40 ft. span. Pop. about 6000. A. sends one member to parliament. A. castle, on the Roscommon bank of the Shannon, was founded in the reign of king John, and has now been rendered one of the chief military positions in Ireland. The fortifications cover 15 acres, and contain barracks for 1500 men.

ATHOL, a town in Worcester co., Mass., on the Fitchburg, and a branch of the Boston and Albany railroads. It contains churches, banks, a high-school, a foundry, and manufactures shoes, mechanical tools, pocket-books, sashes and blinds, billiard tables, pianoforte cases, etc., and publishes weekly and monthly papers. Pop. '90, 6319.

ATHOLE (Pleasant Land), a district of 450 sq.m. in the n. of Perthshire. It occupies a great part of the southern slopes of the Grampian mountains, and is intersected by many narrow glens, down which flow the rapid tributaries of the Tay. It is chiefly composed of gneiss and quartz rock, with beds of primary limestone. Dr. Hutton's explorations among the granite veins in Glen Tilt, were among the chief means of establishing the Plutonic theory of geology. A. was once one of the best hunting districts in Scotland. Athole deer-forest contained 100,000 acres, and 10,000 head of deer, of which 100 were killed annually. In the picturesque pass of Killiecrankie, in this district, 17 m. n.w. of Dunkeld, Claverhouse fell in 1689, though victorious over the troops of king William III.

ATHOR, or **ATHYR**, but properly, *Het-her*, i.e., "the habitation of God," the name of an Egyptian goddess who, in the mythological system of that people, is ranked among the second class of deities. She was the daughter of Ra, the sun. By the Greeks, she was identified with Aphrodite (Venus). The cow was regarded as her symbol, and, in hieroglyphics, she generally appears with the head of that animal, bearing between her horns the figure of the sun's disk. A. is also represented as a cow itself, and as a bird with human face, horns, and the sun's disk. On the oldest monuments, she is frequently portrayed bearing a temple on her head, as in the Athor-capitals of the Ptolemaic buildings, falsely supposed to be heads of Isis. Originally, the goddess had a cosmogonic significance; later, she was called the "mistress of dance and jest," and held in her hands, as symbols of joy, the cord of love and the tambourine. Queens and princesses were often represented by the figure of A. Her worship was generally spread through

Egypt. Her most sacred abode was at Denderah. After her the third month of the Egyptian year was named.

A THOS, HA'GION O'ROS, or MON'TÉ SAN'to, i.e., the Holy hill, the principal mountain of a chain extending, in a peninsular form, from the coast of Macedonia into the Ægean sea, between the gulfs of Contessa and Monté Santo, and connected with the mainland by a narrow isthmus. The length of the peninsula is 40 m.; breadth, 4 m. According to tradition, it received its name from A., son of Neptune, or from A., a giant who battled against the gods. The highest summit in the chain, or Mt. A. proper, a solitary peak at the southern extremity of the peninsula, rises 6350 ft. above the sea-level. In ancient times, several towns were built on A. Herodotus mentions five. The most memorable thing in connection with A., is the canal which Xerxes cut through the isthmus, in order to escape the stormy gales which rendered the navigation round the promontory very perilous, and which had shattered the fleet of Mardonius some years before. Traces of this canal still exist.

ATKINSON, EDWARD, economist, b. Brookline, Mass., Feb. 10, 1827. He has written many articles of value upon social and monetary subjects, among which are *An Easy Lesson in Money and Banking*, Atlantic, 1874, Aug.; *Commercial Development in the First Century of the Republic*, Harper's Memorial Volume, 1876; *An American View of American Competition*, Fortnightly, 1879, Mar.; *What is a Bank?* pamphlet, 1881; *The Rapid Spread of Communism*, Atlantic, 1882, July; *Labor and Capital Allies, Not Enemies*, in Harper's Half-Hour Series; *Taxation and Work* (1892), and *Every Boy his own Book* (1893).

ATLANTA, capital of Georgia and of Fulton county, is the largest city in the state, and the commercial centre of the northern section. It lies at the base of the Blue Ridge, 1100 feet above the sea, near the Chattahoochee river, about midway between the Atlantic ocean and the Mississippi river, and is at the junction of many railroads. Savannah is 294 miles southeast of it, and Augusta, 171 miles east by south. From its elevated location among the mountains it is popularly called the "Gate City," and the climate is healthful and enjoyable, with a mean annual temperature of 61.6° Fahrenheit. The natural drainage is perfect, although it has no water connections.

Atlanta was settled in 1845, and was first called Terminus from the fact of the completion here of the Georgia and Western and Atlantic railroads. It afterwards received the name of Marthasville, but was incorporated in 1847 with its present designation. The history of Atlanta is closely connected with that of our civil war. It had then a population of 15,000. From its admirable location it soon became a great central point of the Confederate armies for manufactures and supplies, and the population rapidly increased to 30,000. It was besieged by Gen. Sherman's army (q.v.), July 21, 1864; the bombardment lasted forty days, many citizens being killed by the shells. It was captured by the Federal troops September 2, 1864, and retained until November, when it was burned by them previous to their march to the sea.

Piedmont, Oglethorpe, and the driving park have fine grounds and beautiful views. Grant Park covers 140 acres. Oakland and West View cemeteries are advantageously laid out. Among the noteworthy buildings are the Capitol, which cost \$1,000,000, the Equitable building, the Chamber of Commerce, and the Kimball House. There are a large number of churches, hospitals, an orphans' home, several universities and colleges, both for colored and white students, the State Technological school, Spelman seminary, a Baptist seminary, military schools, medical colleges, a law school, academies and business colleges, besides high and grammar schools. The State Library and the Young Men's Library are located here. There are many newspapers and other publications, dailies and weeklies. Waterworks near the city derive an ample supply from the Chattahoochee river.

It was the scene of the cotton state exposition in 1881 and of the great Atlanta exposition (q.v.) in 1895. Cotton goods, foundry and machine products, furniture, lumber, oil, tobacco, agricultural implements and fertilizers are some of the principal staples. Ft. McPherson, four miles distant is one of the largest military posts in the United States. Pop. 1890, 65,533; has greatly increased since that date.

ATLANTA EXPOSITION, a cotton state and international exposition, in Piedmont park, Atlanta, Ga.; opened by President Cleveland from his summer home at Buzzard's Bay, Mass., Sept. 18, 1895, and closed Dec. 31 following. There were 13 principal buildings, besides those erected by the states and foreign governments, and over \$2,000,000 was expended on buildings and out-door attractions. The Federal government made a large and diversified display of buildings and exhibits, and each of the Southern States exhibited its distinctive industries and economic interests. A number of national congresses were held during the exposition. The exhibits showing the development of electrical science and the advancement of the negro race were especially significant.

ATLANTIC CITY, a seaside resort, on a long, narrow, sandy island, known as Absecon beach, in Atlantic county, New Jersey; sixty miles southeast of Philadelphia, and 137 miles west by south of New York. The island, three-quarters of a mile wide, stretches for ten miles along the coast, four to five miles from the mainland. Absecon lighthouse is on the north end of the beach. The city is well arranged, Atlantic avenue being 100 feet wide; the streets are named after the states of the union. A board walk skirts the ocean for four miles, forming a charming promenade. The boating and bathing facilities are good for summer or winter, 50,000 persons having enjoyed the surf in one day. There are fine public schools and many churches. Hotels, boarding-houses, and private cottages are numerous for the accommodation of visitors. Forty express

trains daily connect with the Pennsylvania and New Jersey Central railroads. Population, '90, 13,055. During the summer the transient population varies from 25,000 to 150,000.

ATLANTIC HIGHLANDS, a town and seaside resort in Monmouth co., N. J., on Sandy Hook bay and the Central Railroad of New Jersey, 20 miles s. of New York. It has beautiful drives, several churches, schools and newspapers, driven well water, electric lights, and well-known Methodist camp-meeting grounds.

ATLANTIC OCEAN, so called either from Mt. Atlas, or from the fabulous island of Atlantis, is that part of the ocean that divides the old world from the new. Its extreme breadth is about 5000 m., and its narrowest part, between cape St. Roque, in Brazil, and the nearest point in Africa, about 1600 miles. If the A. be supposed to be bounded by the polar circles, and to include the Caribbean sea, Hudson's bay, Mediterranean sea, and the other connected water-surfaces, it covers an area computed at 35 million sq. miles. The A. is naturally divided into three portions—the north, south, and inter-tropical A. It stands in open connection with the n. and s. polar seas, and in the remarkable parallelism of its coasts, resembles rather a vast river than an ocean. Its northern half sends off numerous ramifications on both sides, some of them forming almost shut seas: on the w., Hudson's bay, the gulf of St. Lawrence, and the gulf of Mexico; on the e., the Baltic, North, Mediterranean, and Black seas. In the s., again, both coasts present a comparatively unbroken line; and there is a remarkable correspondence between their projecting and retiring angles, the convex coast of Brazil lying opposite to the gulf of Guinea, and the projection of Senegambia answering to the retirement of the American coast in the Caribbean sea.

The whole of the new world, with the exception of the narrow strip lying w. of the Andes and Rocky mountains, belongs to the *basin* of this ocean. It drains comparatively little of the old world, as may be seen by tracing the water-shed on a map. Owing to the numerous seas and inlets connected with it, the extent of its shores is immense, over 50,000 m., several thousands more than that of the shores of the Pacific and Indian oceans. Except near the continents, the Atlantic is poor in islands compared with the Pacific. The chief islands in the open ocean are Iceland, Farøe, Bermudas, Azores, Ascension, St. Helena, the Falkland islands, South Georgia, and Sandwich land.

The chief A. currents are two. The *equatorial current*, which, starting from about the island of St. Thomas, in the gulf of Guinea, with a rate of motion varying from 18 to 24 m. a day, proceeds westwards on both sides of the equator till near cape San Roque, where it divides, one branch running s. along the coast of Brazil, and the other along the coast of Guinea into the Caribbean sea. The velocity of this current is 24 m. a day at the point where it curves s., whence it gradually diminishes in strength as it proceeds southward to little more than 6 m. a day. Within the south A. there is a complete circulation of the waters, induced by the prevailing winds, and maintained at about 12 m. a day. Its force also varies with the months, being determined by the prevailing force of the wind of each month. Its breadth varies from 200 to 400 m.; and since it is fed by currents from n. and s. of it, its temperature is consequently considerably lower in the eastern than in the western part of its course. The other great current is the *gulf stream*. This, originally part of the equatorial current, after flowing past the Guinea coast, and through the Caribbean sea, issues from the gulf of Mexico through the strait of Florida, and after following the direction of the American coast to about 40°, turns seaward, touches the great Newfoundland bank, and gradually curving round, is lost as a distinct current about the Azores (see GULF STREAM). The water of this stream is often upwards of 20° warmer than the surrounding ocean. The gulf stream has an immense influence on the Atlantic. Besides these great currents, the A. abounds in smaller ones, such as the northerly currents along the e. Greenland and Labrador coasts (this Arctic current extending as far s. as 36° n. lat., its rate being from 24 to 10 m. a day); the southerly current along the w. of Greenland; Rennel's current, w. of the bay of Biscay; and the great current along the w. of Africa, from Morocco southwards, till it is merged in the Guinea current. The whole of these currents follow in every case the prevailing winds of the regions where they flow.

Since over the whole of the eastern half of the A., from about n. lat. 45° northwards, the prevailing winds are south-westerly, there is over the same region a general flow of the water of the ocean towards the n.e., passing the British isles, and thence along the coast of Norway, to some distance e. of the North cape. It is to this circumstance that the mild temperatures of north-western Europe must be referred. The amelioration of the winter climates from this cause is very great, amounting to about 30° in the Hebrides, and to fully 40° in the Lofoden islands. This effect is directly brought about, not by the winds alone, but by the influence of the winds and sea combined. The influence of currents on the temperature of the ocean is so great, that even in Aug., the isothermal of 50° touches the n. of Norway in lat. 72° n., whereas to s.e. of Newfoundland the same isothermal descends to about lat. 42° n. Again, on the meridian of 74° w., the change of temperature from lat. 40° to 35° n., or in 300 m., is 18°.0; whereas on the meridian of 20° w. from lat. 40° to 10°, a distance of 1800 m., the change of the temperature of the sea is only 15°.0.

The temperature of the A. about the equator is, if we except the part between 20° and 35° w. long., above 80°: that of the gulf of Guinea reaches the maximum of 85° in

April; from Oct. to May it is above 80° ; in June and Sept. about 80° ; and in July and Aug. it falls below 80° : that of the Caribbean sea is above 80° from July to Oct., during the rest of the year below 80° , except in July. Between 10° and 30° lat. n., the temperature of the eastern part of the A. is always from 3° to 7° colder than the western, and the maximum and minimum temperatures take place later in the year in the Caribbean sea than off the African coast.

Much has been done recently, particularly by H.M.'s ships *Porcupine* and *Challenger*, in throwing light on the physical geography of the A. The most important of the observations are those of deep and bottom temperatures, from their connection with oceanic circulation, and the distribution of life in the depths of the sea, and the bearings of the questions thereby raised on geological speculation (see art. SEA). Animal life abounds at much greater depths than was formerly supposed; although beyond 6000 ft. it gradually diminishes. A great part of the bottom of the n. Atlantic is covered with a slimy "ooze," composed for the most part of the chalk-producing globigerina; in very deep parts this is replaced by a brown, clay-like mud, with few traces of animal forms.

Regarding the depth of the A., it is only recently that reliable data have been obtained; along certain tracts, especially those of the *Challenger*, the profile of the bottom can now be laid down with considerable certainty. The deepest sounding made by the *Challenger* with its improved method of sounding (see SOUNDINGS), is 3875 fathoms, or 23,250 ft., at a point about 90 m. off St. Thomas, West Indies. A remarkable ridge, about 400 m. wide, and 10,000 to 12,000 ft., or 2 to $2\frac{1}{2}$ m., below the surface of the sea, extends along the bottom of the A. from cape Clear in Ireland to cape Race in Newfoundland, a distance of 1640 miles. Along this, which is known as the "telegraph plateau," the Atlantic cables are laid.

ATLANTIC TELEGRAPH, HISTORY OF. The first experiment in submarine telegraphy was made in 1839 by Dr. W. O'Shaughnessy at Calcutta. Having laid across the river Hooghly a copper wire, insulated with a covering of cotton thread saturated with pitch and tar, he was able to transmit signals through it. In 1842, prof. Morse, of New York, having stretched a submarine cable between Castle Garden and Governor's island, New York, and succeeded in transmitting an electric current from one end to the other, expressed his opinion that it would be possible to effect an electric communication through the sea. After further investigations, he announced to the secretary of the treasury of the United States, "that a telegraphic communication on his plan might with certainty be established across the Atlantic" but it was the successful submarine telegraphic undertakings of Messrs. Brett, who, in June, 1845, registered a "General Oceanic Telegraph Company," with the object, among others, of joining England and America by means of a telegraph "across the Atlantic ocean" (see TELEGRAPH, History), that first fairly convinced the public mind that the new world might be put on what may be termed conversational terms with the old. His experiment was followed in 1847 by that of J. J. Craven, who insulated an iron wire with gutta-percha and placed it in the circuit of the New York and Washington telegraph line, submerging it in the waters of a small creek. This led, in 1848, to the laying of a gutta-percha cable between New York and Jersey City. An experimental line laid across the English channel in 1850 was followed in 1851 by the permanent cable which is still in use. The success of this undertaking revived the project of a telegraph by way of Newfoundland for rapid communication with Europe. The plan was to carry the line across that island to St. John's, the farthest point on the American coast, and there connect with a line of fast steamers, which it was thought could reach the nearest point in Ireland in five days. Thus America could be brought easily within a week of Europe. The supposed great depth of the Atlantic ocean presented the most imposing obstacle to this desired closeness of communion; but when it was discovered that between Ireland and Newfoundland there extended, along the bottom of the Atlantic, at a depth of not more than two miles below the surface, a fine, broad platform (see ATLANTIC OCEAN) seemingly so specially formed by nature for the purpose of electric communication that capt. Maury at once designated it the telegraphic plateau, the object of an Atlantic submarine cable assumed a practical form. In 1854, the attention of Mr. Cyrus W. Field, of New York, was directed to the subject, and while he was considering this proposal, the thought flashed upon him, "why not carry the line across the ocean?" In 1854, the colonial government of Newfoundland passed an act incorporating a company to establish telegraphic communication between the old world and the new, and aided by a subsidy, and by grants of land. The colonial government also conferred upon the company the exclusive right of landing a telegraphic line upon the coast under its jurisdiction. The governments of Prince Edward's island and the state of Maine made similar concessions; and authority for certain subsidiary operations in Canada were also obtained. The company, incorporated under the title of "The New York, Newfoundland and London Telegraph Company," commenced operations by uniting St. John's in Newfoundland with lines in the United States and British North America. But in a work of such magnitude, it was very much easier to conceive than to execute. To build the line across Newfoundland was no small undertaking. It was a distance of 400 m., through a wilderness, over land that was wild and waste, marsh and moor, or rocks and hills, and often through dense forests, where every step of the way had to be cleared by the woodman's axe. This overland work took many months' time. Then to connect the

island with the mainland, a cable had to be laid across the gulf of St. Lawrence. One was sent out from England in 1855, but the first attempt to lay it was a failure. The next year a second attempt was made with success. The work thus completed, though costly, was merely preliminary to the more serious undertaking which now began. For now, numerous preliminary experiments were undertaken by eminent electricians and engineers, in order to determine the amount of retarding force which inducted and disguised electricity were likely to offer to the transmission of currents along submarine wires of unusual length. Having by these experiments, 2000 in number, tried with 62 different kinds of cable, determined the one best adapted for the conveyance of electricity through such a length, and at such a depth in the Atlantic, the next step was the formation of a more influential company. The practicability of a transatlantic telegraph was doubted by many of the first authorities, both in England and America. Eminent engineers declared that it was beyond the resources of human skill to span the ocean with a cable over 2000 m. long. Even the great Robert Stephenson shook his head, and anticipated only failure. Electricians added that even if it were laid, the electric current could not be sent that distance. To be sure, there were eminent authorities on the other side. The great Faraday encouraged the American projector. But still, both scientific men and practical men were so divided, that it was very difficult to inspire in either country the degree of confidence necessary to success. In face of all these obstacles, Mr. Field went to London, and there succeeded in 1856 in organizing the first Atlantic telegraph company and raising the necessary money to carry out the project, subscribing himself for more than one-quarter of the entire capital, and "the A. T. Company," to which all the privileges conferred on the old company were handed over, was formed with a capital of £350,000. The governments of Great Britain and the United States liberally aided the company, guaranteeing until such time as its dividend reached 6 per cent., a subsidy of £14,000 a year, and of £10,000 subsequently. They also agreed to furnish ships for laying down the cable of 1857. The conductor consisted of 7 fine copper wires, no. 22 gauge, twisted tightly together, forming a cord $\frac{1}{4}$ in. thick, and weighing 107 lbs. per mile. This thickness was increased to $\frac{3}{8}$ in., by a core of three layers of gutta-percha. Outside the core was a jacket of hempen yarn, saturated with pitch, tar, beeswax, and boiled linseed oil. The outer sheath consisted of 18 strands, each formed of 7 no. 22 iron wires. The whole diameter was about $\frac{9}{16}$ in., and the weight 1 ton per mile. In the manufacturing processes, the wires and yarns were twisted round each other by revolving drums and circular tables worked by steam-power, while the coatings of gutta-percha were applied by forcing the substance through dies which had the copper conductor passing through their center.

The *Niagara* and the *Agamemnon*, the one lent by the U. S. government and the other by the English, took 1250 m. of the cable each, and steamed forth from Valentia (w. coast of Ireland) on August 7, 1857. The *Niagara* paid out her portion of cable as she went. On the 11th, in an attempt to slacken the rate of paying out, the cable snapped, and the end sank in 2000 fathoms water, at 280 m. from Ireland. The appliances on board were not sufficient to remedy the disaster, and the two ships returned to Plymouth, where the two portions of cable were placed in tanks until the next following year.

The Atlantic Telegraph company raised more capital, made 906 m. additional cable, and prepared for a new attempt in 1858. The *Niagara* and *Agamemnon* were again employed; but the submersion was to begin in mid-ocean, one ship proceeding eastward, and the other westward, after splicing the two halves of the cable. They left Valentia June 10; but it was not till the 26th that they could finish the splice and commence the submersion. On the 29th, a double breakage took place, and 144 m. of cable went to the bottom, wholly severed from the rest. The *Agamemnon* returned to England for improved appliances and further instructions; and a month was thus lost. Then came the severest trial—for even the directors lost faith. When it was proposed to renew the attempt the vice-president left the room in disgust, and refused to take part in an undertaking so hopeless. But the rest stood by manfully, and resolved to try again. The ships returned to mid-ocean, whence they were to start, paying-out towards opposite shores, on the 17th of July, 1858. The cable was united and lowered on the 29th of the same month; and the *Agamemnon*, notwithstanding a severe gale of wind, arrived at Valentia, having successfully laid her portion of it, on the morning of the 6th of Aug. The *Niagara* about the same time arrived in Trinity bay, Newfoundland, and to the amazement of the world, this time the experiment proved a success. On the 17th Aug., the extremities of the cable having been put in connection with the recording-instruments, the following message was flashed through the ocean in thirty-five minutes: "Europe and America are united by telegraph. Glory to God in the highest; on earth peace and good-will towards men." Messages and replies from the queen to the president of the United States, from the mayor of London to the mayor of New York, etc., followed. The American people were in a frenzy of enthusiasm, lauding the ocean telegraph as the greatest achievement of modern times, and giving unbounded praise to its heroic projector; the president of the United States and many distinguished persons on both sides of the Atlantic sending congratulatory messages to Mr. Field. The station at Newfoundland was connected by wires and cables with the general telegraphic system of America and that at Valentia with the general system of Europe. The cable continued

working until Sept. 1, sending 129 messages (of about 11 words each on an average), from England to America, and 271 from America to England; but as it had been injured by the winter's sojourn at Plymouth, it soon began to mutter fitfully, and on the 4th of September, the signals of Valentia became unintelligible. Then ensued one of those revulsions of feeling so common in the history of all great enterprises, where at first success alternates with defeat. The public became almost ashamed of its late enthusiasm. Many doubted whether there had ever been a message across the ocean, and the whole subject became one for incredulity and ridicule. One commercial message of great importance passed through the cable, in reference to the collision between the Atlantic steamers, the *Europa* and *Arabia*; this single message saved the commercial world £50,000, which would doubtless have been spent in extra insurance on the vessels and cargoes thus delayed. Three years after, the civil war commenced, and it was difficult to get people in the United States to listen to commercial enterprises during the excitement of that great contest. But Mr. Field was not idle; he was constantly crossing and re-crossing the Atlantic, and addressing chambers of commerce and public meetings in England and the United States, the results being that in 1864 the necessary capital was raised to renew the enterprise.

From 1858 to 1864, the company were engaged in endeavoring to raise new capital, and to obtain increased subsidies from the English and American governments; while scientific men were making improvements in the form of cable, and in the apparatus for submerging it. At length the Telegraph Construction and Maintenance company (formed by an amalgamation of the Gutta-percha company with the wire-cable-making firm of Glass & Elliott) made an entirely new cable, much thicker and more costly than the former one. The conductor, 300 lbs. per mile, and $\frac{1}{4}$ th in. thick, consisted of 7 No. 18 copper wires, each $\frac{1}{16}$ th in. thick. The core was formed of four layers of gutta-percha alternating with four of Chatterton's compound (a solution of gutta-percha in Stockholm tar); the core and conductor together were 700 lbs. per mile, and $\frac{3}{8}$ th in. thick. Outside this was a jacket of hemp or jute yarn, saturated with preservative composition. The sheath consisted of 10 iron wires, No. 13 gauge, each previously covered with 5 tarred manilla yarns. The whole cable was $1\frac{1}{2}$ in. thick, and weighed $35\frac{1}{2}$ cwt. per mile, with a breaking strain of $7\frac{1}{2}$ tons.

As the cable (2300 m.) weighed more than 4000 tons, it was resolved to employ the *Great Eastern* steamship to carry it out and lay it. Three enormous iron tanks were built in the fore, middle, and aft holds, from 50 to 60 ft. diameter each, by $20\frac{1}{2}$ ft. deep; and in these the cable was deposited, in three vast coils. On July 23, 1865, the *Great Eastern* started from Valentia with her burden, the main cable being joined end to end to a more massive shore cable, which was drawn up the cliff at Foilhummerum bay, to a telegraph house at the top. The electric condition of the cable was kept constantly under test during the progress of the ship; and more than once the efficiency was disturbed by fragments of wire piercing the gutta-percha and destroying the insulation. On Aug. 2, the cable snapped by over-straining, and the end sank to the bottom in 2000 fathoms water, at a distance of 1064 m. from Ireland. Then commenced the remarkable process of dredging for the cable. A five-armed grapnel, suspended from the end of a strong iron-wire rope, 5 m. long, was thrown overboard; and when it reached the bottom, it was dragged to and fro across the line of cable by slow steaming of the *Great Eastern*; the hope being that one or other of the prongs would catch hold of the cable. A series of disasters followed by the breaking of swivels, and the loss of grapnels and ropes; until at length, on Aug. 11, it was found that there were no more materials on board to renew the grappling. The *Great Eastern* returned to England, leaving (including the operations of 1857-1858) nearly 4000 tons of electric cable useless at the bottom of the Atlantic.

A new capital, and new commercial arrangements altogether, were needful for a renewal of the attempt. Another cable was made, slightly differing from the former. The jacket outside the core was made of hemp instead of jute; the iron wires of the sheath were galvanized, instead of being left in their natural state; and the manilla hemp which covered them was left white instead of being tarred. These few changes made it weigh nearly 500 lbs. per mile less, mainly through the absence of tar; while its strength or breaking strain was increased. Enough of this cable was made to span the Atlantic, with allowance for slack; while a sufficient addition of the 1865 cable was provided to remedy the disaster of that year.

The A. T. operations in 1866 were of a remarkable and interesting kind. On July 13, the *Great Eastern* set forth from Valentia, accompanied by the steamers *Terrible*, *Medway*, and *Albany*, which were to assist in the submersion and in subsidiary matters. The line of route was chosen midway between those of the 1858 and 1865 cables, for the most part a few miles from each. The *Great Eastern* exchanged telegrams almost continuously with Valentia during her progress. The mishaps were few in number, and easily remedied; and the *Great Eastern* safely entered the harbor of Heart's Content, Newfoundland, on the 27th. After this, operations commenced for recovering the end of the 1865 cable, and completing the submersion. The *Albany*, *Medway*, and *Terrible* set off, on Aug. 1, to the spot on the ocean beneath which the end of the cable was lying, or as near to it as calculations could establish. Certain buoys, left anchored there twelve months previously, had been carried away by the storms of the preceding winter; but the latitude

and longitude had been very carefully registered. The *Great Eastern* started from Heart's Content on the 9th, and then commenced a series of grappling operations, which continued through the rest of the month. The cable was repeatedly caught, and raised to a greater or less height from the ocean-bed; but something or other snapped or slipped every time. After much trial of patience, the end of the cable was safely fished up on Sept. 1; and electric messages were at once sent through to Valentia, just as well as if the cable had not had twelve months' soaking in the Atlantic. An additional length having been spliced to it, the laying recommenced; and on the 8th the squadron entered Heart's Content; having thus succeeded in laying a second line of cable from Ireland to America.

Mishaps have since taken place; but in every case the injuries have been attended to, and the two cables maintained in good working order. The rapidity of signaling (at first only two words per minute) was greatly increased; the tariff of charges was lowered; the public of the two nations used the cable-telegraph extensively; and the company realized good dividends, notwithstanding the heavy expenditure which had been incurred.

The art of laying submarine cables being thus established, many other projects for Atlantic telegraphy have from time to time been started. One scheme was for a line from the n. of Scotland to Farøe islands, Iceland, Greenland, and some point near the mouth of the St. Lawrence; but the projectors did not succeed in raising capital. A French company afterwards planned a direct route from France to America. In June, 1869, the *Great Eastern* steamed out of Brest with this new cable, no less than 2328 m. long; and the submersion was successfully effected. There is a connection between Brest and Falmouth. A new French cable from Brest to the island of St. Pierre, to the s. of Newfoundland, was laid in the end of 1879. In the year 1874, a third British cable was successfully laid from Ireland to Newfoundland. A "Direct United States Cable Company" was also formed; Messrs. Siemens undertook the manufacture of the cable, the lightest yet planned for Atlantic telegraphy, its weight being 480 lbs. of copper and 400 lbs. of gutta-percha per mile; about 3060 m. were needed from Ireland to New Hampshire. The laying of this cable was completed early in the summer of 1875.

Lower down the Atlantic, extensive operations have been or are being completed. When a cable had been laid from Falmouth to Lisbon, the latter became the starting-point for extensive ocean routes. The "Brazilian Submarine Cable Company" began in 1873 a cable to extend from Lisbon to Madeira, St. Vincent, and Pernambuco. The whole length is 4000 m., of which the longest section (across the ocean) is somewhat under 2000 m.; it is connected at Pernambuco with other cables to Para, Rio Grande, etc.

There is a "Direct Spanish Cable" from the Lizard to Bilbao; and there are duplicate lines from Falmouth to Lisbon. In and near the gulf of Mexico, the electricians have been working with great energy. Most of the principal West India islands are connected by cable one with another, with Colon (Panama), and with the U. S. mainland at Florida. The French cable co., (beginning 1880,) contracted with the American Union telegraph co., for the exchange of business for 20 years, based on the understanding that the former was to agree to no consolidation with other cable cos. Considerable cutting of rates ensued between the rival lines, but in the end the French cable co. entered into an arrangement with the Anglo-American and the direct U. S. cable co., for a division of business. In consequence, the American telegraph and cable co. was incorporated in the interest of the American Union telegraph co., which laid two new transatlantic cables and opened them for business, 1881, Sept. 17. Next year, however, this line also joined in consolidation with the other three lines. In 1883 the Commercial cable co., better known as the Mackay-Bennett co., was organized. No stock was offered to the public. Two lines of cable were laid from Valentia, Ireland, to Dover bay, Nova Scotia, and opened for business in 1884. See TELEGRAPH.

ATLANTIS, according to ancient tradition, the name of a vast island in the Atlantic ocean. It is first mentioned by Plato, who represents an Egyptian priest as describing it to Solon, but, of course, according to Plato's view of the matter. In this description, A. appeared as an island larger than Libya and Asia Minor taken together, and lying off the pillars of Hercules in the Atlantic ocean. Plato gives a beautiful picture of the interior of this imaginary land, and enriches it with a fabulous history. Some early writers supposed that the Canary islands were the remains of the old A.; for Plato had stated that at the close of the long contest which its inhabitants maintained against the Athenians, 9000 years before his time, the sea suddenly engulfed the island, and had ever since been unnavigable, by reason of the shoals of mud created by the sunken island. Some found it in the Scandinavian peninsula; others (first Bircherod in 1685) have supposed that Phœnician or Carthaginian merchant ships had been driven by storm on the coast of America, and that the supposed vast island of A. mentioned by Plato, as well as the great unnamed island spoken of by Pliny, Diodorus, and Arnobius, may have been the new world. See Donnelly, *Atlantis* (1882).

ATLAS is that piece of the human vertebral column which is nearest to the skull; in other words, it is the first cervical vertebra. It may be known from the other six by its being without a body or spinous process, by its being a mere irregular bony ring, partly divided into two unequal parts by a constriction; this division in the recent subject is completed by a ligament, the part in front being occupied by the tooth-like process of the

second cervical vertebra, and that behind by the spinal marrow. On each side, the ring is very thick; it is smooth and cupped above to receive the condyles of the occipital bone. The corresponding parts below are flat, and rest on the second cervical vertebra.

The A., with the occipital bone forms the joint on which the head moves in bowing; and turns on the pivot of the second cervical vertebra, when we look from side to side.

ATLAS, according to Hesiod's *theogony*, one of the Titans, the son of Iapetus and Clymene, and brother of Menœtius, Prometheus, and Epimetheus. Apollodorus, however, states him to have been a son of Asia, and Hyginus, a son of Æther and Gaea. He married Pleone, daughter of Oceanus (or Hesperis, his own niece), and became the father of the Pleiades. As leader of the Titans, he attempted to storm the heavens, and for this supreme treason was condemned by Zeus to bear the vault of heaven on his head and hands—the sting of this mythological punishment obviously being that A. was compelled to support what he thirsted to destroy. The later writers, however, rationalize the myth, and state that A. was a mighty king who had great skill in astronomy, and only tried to storm heaven intellectually.—In consequence of the ancient views which made the vault of heaven rest on solid pillars or other supports, the name A., originally mythological and cosmogonic, was introduced into geography. Mercator, in the 16th c., gave the name A., to a collection of maps; probably because the figure of A. supporting the heavens had been given on the title-pages of such works.

ATLAS, a mass of mountain-land in the western part of north Africa. Herodotus mentions a smoking mountain of this name situated on the s.w. of the Little Syrtis, and twenty days' journey westwards from the Garamantes, styled by the natives the "pillars of heaven." By later writers, after the time of Polybius, the name A. was always given to the chain of mountains in n.w. Africa extending from the island of Cerne (now cape de Ger) n.w. through Mauritania, and Tingitana (now Fez and Morocco), and including also the heights dispersed through the region of Sahara. It is divided into the Little Atlas and the Great Atlas; the former denominating a secondary range in the country of Sous, and the other, the loftier mountains of Morocco. The A. is not properly a mountain-chain, but rather a very irregular mountainous mass of land formed of many chains running in various directions, meeting in mountain-knots, or connected by yokes, or short chains of inferior height, and diversified still further by several solitary mountains and groups of mountains. The A. attains its greatest height (13,000 ft.) in Morocco, the only part where it rises above the snow-line, and obtains the name of Jebel-el-Thelj, or Snowy Mountains. Its highest peaks are Miltin—27 m. s.e. of the city of Morocco—Bibawan, and Tagherain. The most southern chain diverging here from the central mass bears the name *Jebel-Hadnar*. The heights approach the sea, and form the promontories jutting out into the Atlantic. From Morocco, the A. gradually decreases in height towards the east. In Algeria, the elevation is only 7673 ft.; in Tunis, 4476 ft.; and in Tripoli, 3200 ft. The whole mountain-system is intersected by the valley of the Mulua river, which flows through the n.e. part of Morocco, and falls into the Mediterranean. The slopes on the n., w., and s. are covered with vast forests of pine, oak, cork, white poplar, wild olive, etc. The valleys are well watered and capable of cultivation with great profit. The A. seems to be chiefly calcareous in its composition. The mineral wealth remains, however, almost wholly unexplored, though copper, iron, lead, antimony, etc., are stated to exist in abundance.

ATLAS, the name given, in commerce, to a silk satin manufactured in India and other eastern countries, and at one time largely imported by European merchants. *Atlas* means satin in the Danish, Dutch, German, Polish and Russian languages, and the Swedish *atlaske* has the same significance. This material was wrought with threads of gold or silver, was either striped or flowered, and was woven in the most skillful manner, though it lacked the lustre of French silks. The practice in China was to weave strips of paper gilded on one side into the silk, or to twist the slips about gold thread; the result being a showy but inexpensive fabric.

ATLAS POWDER, an explosive containing nitro-glycerine, but cheaper and less dangerous than some compounds of that element, while effecting as great results. For use in shafts, tunnels, etc., it is superior to blasting powder, as it penetrates deeper and breaks the rock into smaller pieces. It may be burned in the open air with safety, but, when confined and fired, explodes with tremendous power. It decomposes when exposed to the sun for any length of time. Like dynamite, it becomes solid in cold weather, is ineffective when frozen, and is most sensitive in its normal, pasty state. The cartridges, containing from 15-75 per cent. of nitro-glycerine, are 6 or 8 in. long, and from $\frac{3}{4}$ in. to 2 in. in diameter. See **EXPLOSIVES**.

ATLEE, SAMUEL JOHN, 1738-86; b. Pa.; commander of a Pennsylvania company in the old French war, and of an advanced battalion in 1776; was taken prisoner by the British, on Long Island, in that year; afterward became a commissioner to the Indians; was a member of the continental congress, 1778-82, representing Lancaster, and served on the committee on the mutiny of the Pa. troops in 1781.

ATLEE, WASHINGTON L., 1806-78, born at Lancaster, Pa., surgeon, graduate of Jefferson medical college, and professor of chemistry there in 1844. He was the author of a great number of medical papers, and was distinguished for success in ovariectomy.

ATMIDOMETER or **ADMOMETER** (Gr. *atmos*, vapor, and *metron*, a measure; Latin, *atmidometrum*), an instrument for measuring the vapor exhaled from a humid surface in a given time, and used in the practice of the English medical corps. One form of A., used for measuring the rate of evaporation from ice, snow, or water, consists of a copper or glass, oblong bulb, connected by a slender neck with a globular bulb which is weighted with mercury or shot. A stem of metal or glass surmounts the upper bulb. The stem is graduated to grains and parts, and a shallow metal pan is fixed to its top. The instrument is placed in a vessel filled with water and fitted with a cover having a circular hole, through which the stem protrudes. Distilled water is then poured into the pan until the zero on the stem sinks to the level of the cover of the vessel. The stem rises as the water in the pan evaporates, and the amount of evaporation in grains and fractions is indicated by the scale.

ATMOMETER (Gr. *atmos*, smoke, vapor, and *metron*, a measure); an instrument invented by Sir John Leslie for the purpose of ascertaining the amount of water exhaled in a given time from a humid surface, and described as a thin, porous, earthenware ball, one to three in. in diameter, with a small neck cemented to a long, wide glass tube, to which a brass cap with a close-fitting collar of leather is adapted. When filled with distilled water, the waste and descent of this column shows the quantity of evaporation from the surface of the ball. The tube has from 100–200 lines marked downwards on it; these corresponding to the rings of fluid that would form a film 1000th of an in. thick if spread over the entire exhaling surface. The cavity of the instrument is then filled with distilled water, (the cap tightened and the ball wiped dry,) and the A. hung where it will be exposed to wind, but not to rain. As fast as the water evaporates from the external surface, it transudes through the ball, and the liquid, descending in the stem correspondingly, gives the measure of the waste.

In another form of A., a balance is used, on one end of which a porous earthenware vessel full of water is poised, the weights indicating the amount of evaporation in a given time.

The possibility of obtaining an accurate A. is doubtful, owing to the meteorological and other causes that influence the process of evaporation.

ATMORE, CHARLES, 1759–1826; b. England; son of a sea-captain. Entering the Wesleyan ministry in 1779, he was in Feb. 1781, sent out as an itinerant evangelist by John Wesley, and in August appointed a regular preacher. Wesley, three years after, caused the young man's name to be inserted in the deed of declaration as a member of the legal conference; a high tribute to his character. He became prominent in the denomination; especially so in the consolidating of the Wesleyan Methodist church. He ministered in York, Edinburgh, London, Sheffield, and other towns until 1825, and while at Hull in 1811 was made president of the Wesleyan conference. His chief publications were *Discourses on the Lord's Prayer* (1807); and the *Methodist Memorial*, which has been described as "a perfect treasury of information on early Methodism."

ATMOSPHERE (Gr. *atmos*, vapor, *sphaira*, sphere) is the name applied to the gaseous envelope which surrounds the earth. The existence of an A. is to us a matter of vital importance. We owe to its influence the possibility of animal and vegetable life, the modifying and retaining of solar heat, the transmission of sound, the gradual shading of day into night, the disintegration of rocks, and the occurrence of weather phenomena. In consequence of the action of gravity, the A. assumes the form of a spheroidal stratum concentric with the earth, and presses heavily on its surface. It exhibits, in common with all fluid bodies, the usual characteristics of hydrostatic pressure, but its internal condition differs from that of a liquid inasmuch as its particles repel each other, and can only be held in proximity by external force. From this circumstance, it follows that the volume of any portion of air varies much more under the influence of external pressure than that of an equal volume of water; hence, the stratum of air nearest the earth is denser than strata in the upper regions, where, from their being subjected to the weight of a smaller mass of superincumbent air, the repulsive force of the particles has freer play.

That air possesses weight, is illustrated by the following simple experiment: If a hollow glass globe of 5 or 6 in. in diameter be weighed first, when filled with air, and then, after the air has been extracted from it by means of the air-pump, it will, when thus exhausted, weigh sensibly less than it did before, and the difference of the two results will represent the weight of the quantity of air which has been withdrawn. It has been determined by Biot and Arago that 100 cubic in. of dry air, when the barometer is at 30 in., and the thermometer at 60° Fahr. weigh 31.074 grains. The law of Archimedes (see ARCHIMEDES, PRINCIPLE OF), that a body immersed in a fluid loses a part of its weight equal to the weight of the volume of fluid displaced by it, finds its application in the A. as well as in water. If a glass globe filled with air and closed be suspended at the extremity of the beam of a delicate balance, and be kept in equilibrium by a brass weight at the other extremity, and if the whole be then placed under the receiver of an air-pump, and the air extracted, the equilibrium previously existing in air will be disturbed, and the larger body will become the heavier. The reason of this is, that when first weighed, they each lose as much of their own weight as that of the respective volumes of air displaced by them, and are therefore made buoyant, though in different degrees, the ball with the larger volume having the greater buoyancy. In a vacuum, they

are deprived of this buoyancy, and the larger body, suffering the greater loss, becomes sensibly heavier than the other. In like manner, a balloon filled with heated air or hydrogen gas is lighter than the volume of air displaced by it. It is therefore forced upwards till it reaches a stratum of such density that the weight of the volume of air there displaced by it equals the weight of the balloon itself. In this stratum it will remain poised, or move horizontally with the currents to which it may be exposed.

In endeavoring to determine the *form* of the atmospheric envelope, it is necessary to bear in mind that, according to the law of fluid-pressure, in order to produce a state of equilibrium at the level of the sea, the pressure of the A. must be equal at that level over the whole of the earth's surface. Gravity acts with less force on the air at the equator than on that at the poles, in consequence of the spheroidal form of the earth. It has there, in addition, to contend with the centrifugal force, which entirely fails at the poles, and which has a tendency to lighten the air by acting contrary to that of gravity. Hence we infer, that in order to produce the same pressure at the level of the sea, the atmospheric height at the equator must be greater than that at the poles, and that the A. must therefore possess the form of an oblate spheroid, whose oblateness is considerably greater than that of the earth itself. The greater heat at the tropical regions must also have the effect of increasing the oblateness.

The *height* of the A. has not yet been determined. That it must have a certain limit, is evident from the consideration that there must be a point at which gravity on the one hand, and centrifugal force and the repulsive action of the particles on the other, are poised, and beyond which, the latter forces overbalancing the former force, the aerial particles would be borne away from the earth. As, however, the law of the diminution of temperature, which materially affects the repulsive action, is unknown for the upper regions of the air, it is impossible to calculate the height of the atmosphere from the relations of these forces. From the observation of luminous meteors, it is inferred that it is at least 100 m. high, and that, in an extremely attenuated form, it may even reach 200 miles.

The *pressure* of the A. is one of its most important properties. Its effect is exhibited in the action of the ordinary water-pump. The piston is fitted air-tight in its cylinder; and on being drawn up, creates a vacuum. The water within the pump being thus freed from pressure, while that outside of it is exposed to the pressure of a column of air reaching to the surface of the A., is at once forced up by reason of the weight of air which it must rise to balance. The ascent of the water takes place till the piston has reached the height of nearly 34 ft., from which we conclude that a column of air is equal in weight to a column of water of the same horizontal section, and of the height of nearly 34 feet. As mercury is 13.6 times heavier than water, a mercurial column freed from atmospheric pressure at the one extremity, and subjected to it at the other, is 13.6 times less in height than the column of water, or about 30 in. From the more convenient size of this column, mercury has been adopted as the standard for atmospheric pressure, and is employed in our ordinary barometers (q.v.) A mercurial column of 30 in. in height, and 1 sq.in. in section, weighs 15 lbs. (more accurately, 14.73), which gives us the equivalent weight of a column of atmospheric air of the same section. The word A. is often employed to express this weight or pressure on a sq.in. of surface, so that when we speak, in mechanics, of the pressure of steam on a boiler as amounting to three atmospheres, we mean a pressure of 45 lbs. on the sq.in. The pressure on a sq.in. being thus ascertained, we have merely to multiply it by the number of sq.in. on the earth's surface to obtain the total weight of the A. It amounts to 11.67085 trillions of lbs., or about

11,670,850,000,000 of the earth's mass. It must be observed that the height of the barometric column is not a constant quantity, as it varies with the latitude, the season of the year, and the hour of the day. At London, its mean height is 29.88 in.; at Paris, 29.92 in. The pressure of the A. in the northern hemisphere increases as we recede from the equator, reaching a maximum at 30° n. lat., and decreasing from 30° to 65°, where it again begins to rise. The greater height at 30° is said to be due to the accumulation of air at that latitude by the action of the trade-winds. As the heat of the earth's surface increases the rarity of the air above it, and causes the air at the top of the heated column to overflow, we would expect that, during the year, the barometer would stand at a minimum in summer, and a maximum in winter. In reality, however, although the barometer is highest in midwinter, there is another maximum in midsummer, making thus two minima—one in spring, the other in autumn. This arises from the part which watery vapor plays in the pressure of the atmosphere. The heat of midsummer introduces into the air a large quantity of moisture, in the form of elastic vapor, which, adding its pressure to that of the dry air, raises what would otherwise be the minimum barometric column to a higher point than that at which it stands in spring and autumn. Similar causes affect the pressure of the A. during the 24 hours of the day. There are two maxima—one at 10 A.M., the other between 10 and 11 P.M.; and two minima—at 4 A.M. and 4 P.M. Very slight variations indicate the existence of atmospheric tidal waves; but this subject is still involved in some obscurity. The pressure of the A. exercises a most important influence on the organism of the human frame. A man of ordinary stature is exposed to a pressure of about 14 tons; but as the air permeates the whole body, and presses equally in all directions, no inconvenience is found to result

from it. From experiments instituted by the brothers Weber in Germany, it has been ascertained that the heads of the thigh and arm bones are kept in their sockets by the pressure of the A.; and in balloon ascents the aéronaut often suffers from bleeding at the nose, lips, and even eyes—a fact that would seem to indicate that the strength of the blood-vessels has been adjusted with reference to atmospheric pressure.

Chemical Composition of the A.—Recent chemical researches give the following as the mean composition of 100 volumes and of 100 grains of dry air:

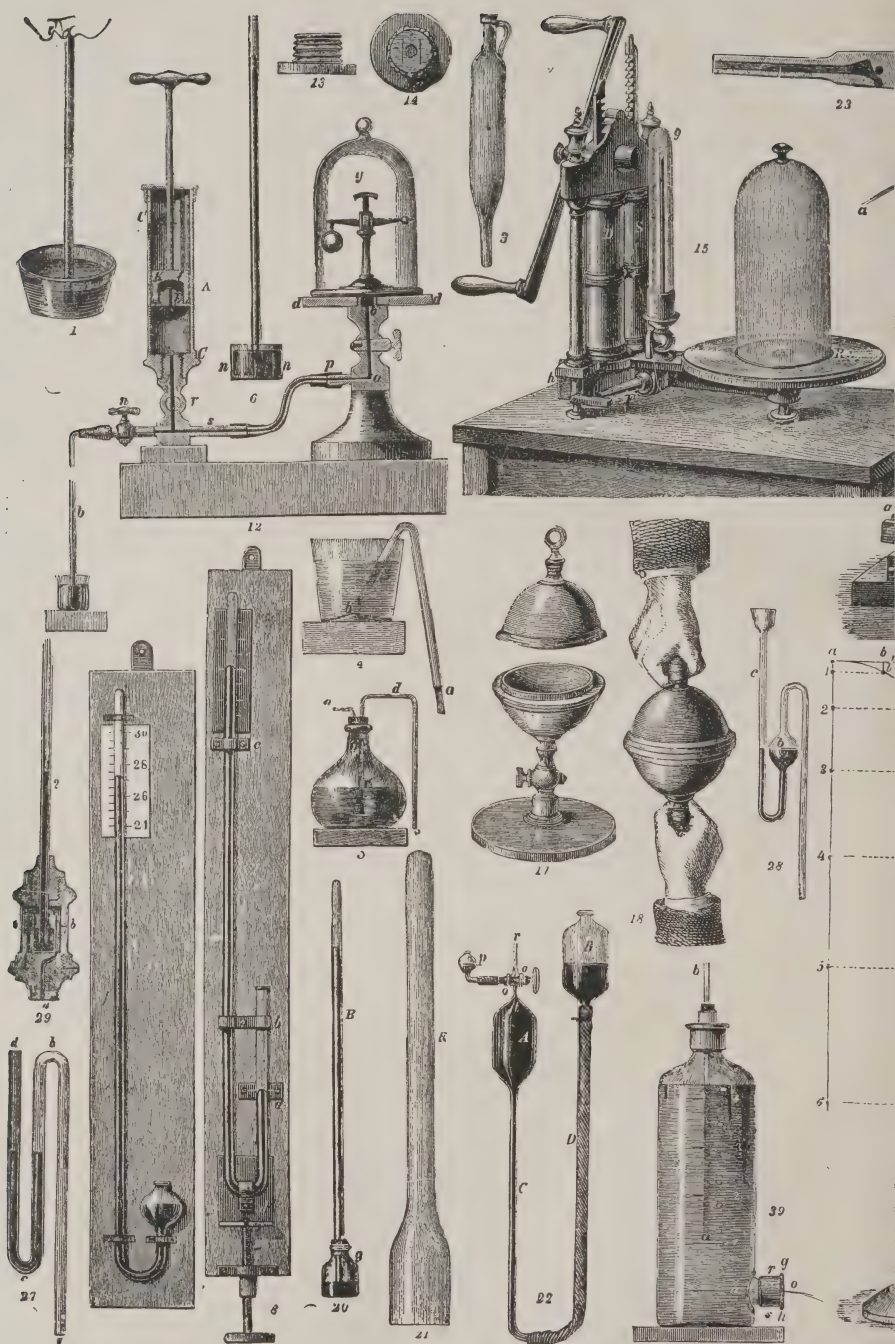
	Volumes.	Grains.
Nitrogen.....	79.02	76.84
Oxygen.....	20.94	23.10
Carbonic acid.....	0.04	0.06
	100.00	100.00

Besides the substances just named, other gaseous matters occur, but in quantities so small as not sensibly to increase the bulk of the A., such as ammonia and ammoniacal salts, carbureted and sulphureted hydrogen, carbonic oxide, sulphurous and sulphuric acid, nitric acid, and perhaps iodine, the quantity and even the presence of which are affected by local and meteorological causes. Roughly speaking, then, dry air may be said to consist of 4 volumes of nitrogen and 1 of oxygen, with a slight admixture of carbonic acid, and a mere trace of several other substances. As, however, the air of the A. is never found dry, we must add to the constituents already named watery vapor, the amount of which is constantly changing, according to locality, weather, wind, and temperature. It is stated that of 1000 grains of atmospheric air, the proportion due to aqueous vapor varies from a minimum of 4 to a maximum of 16 grains. By far the most active chemical constituent of the A. is oxygen, to the agency of which are owing the existence of animal life, the maintenance of combustion, the rusting of metals, and the occurrence of several other chemical phenomena too numerous to be detailed. A small portion of this oxygen occurs in the form of ozone (q.v.), a modification which, according to recent chemical discoveries, plays an important part in the chemistry of the A. The nitrogen which forms the bulk of the A. possesses few chemical properties of importance, but performs the important part of diluting the oxygen, which, if it occurred alone, would act with too great intensity. The presence of carbonic acid in the air is shown by the production of the white carbonate of lime in lime-water freely exposed to its influence. Carbonic acid is produced in all processes where carbonaceous matter unites itself with the oxygen of the air, such as in animal respiration, in combustion, in fermentation, in putrefaction, and similar processes. The green leaves of plants, on the other hand, possess, in presence of sunshine, the power of decomposing carbonic acid into its elements, absorbing the carbon for their own tissues, and restoring the oxygen to the A. in its original purity. Between the processes above mentioned, on the one hand, and the action of plants on the other, the quantity of carbonic acid in the air is kept nearly constant. From the table it will be seen that 10,000 volumes of atmospheric air contain 4 volumes of carbonic acid. If it occurred in a much larger proportion, being poisonous, it would become dangerous to animal life; and if it occurred in a much less proportion, the vegetable world would lack its requisite nourishment. The other substances, of which a trace is always or only sometimes found in atmospheric air, are difficult to detect in the air itself, but are generally found dissolved in rain-water, more especially in that which has fallen immediately after a long drought. Of these, by far the most important and widely diffused are ammonia and ammoniacal salts, which are of essential importance to the vegetable economy, because, dissolved in the rain, they furnish plants with the nitrogen required by them for the production of their flowers and fruit. Nitric acid is detected in the air after thunder-storms, sulphureted hydrogen in the tainted air of sewers and such like places, and sulphurous and sulphuric acid only in the neighborhood of chemical or smelting works. A considerable quantity of carbonic oxide and carbureted hydrogen escapes unconsumed from our furnaces; and although the latter gas is in addition given off to the air in marshy and bituminous districts, the two occur in almost inappreciable quantity in the atmosphere.

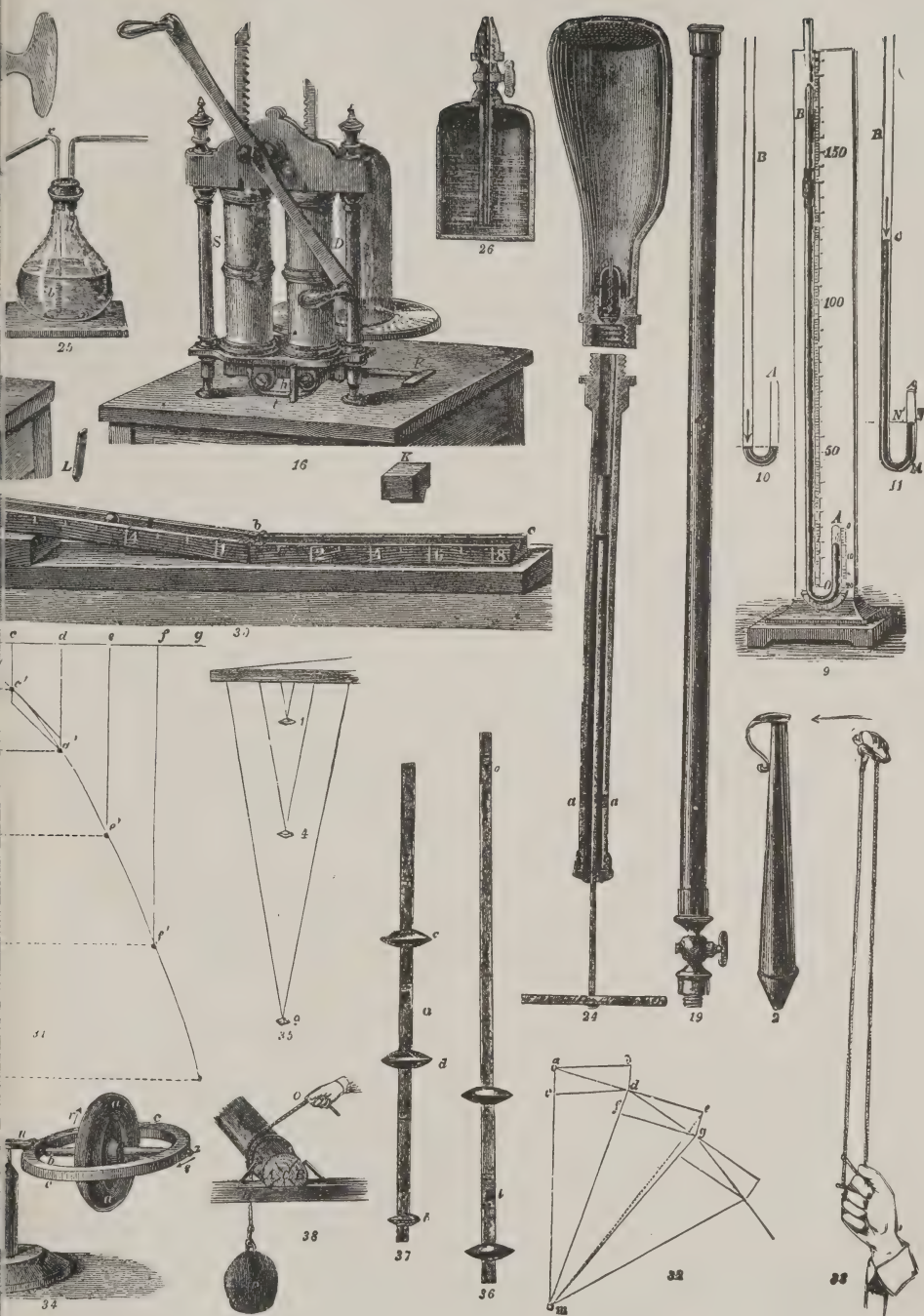
In addition to its gaseous constituents, the A. contains solid substances in a state of exceedingly fine division, the presence of which is revealed in the sunbeam. Many of these minute particles, being the seeds or germs of plants and animals, must exert an important influence on the organic substances on which they may finally settle, inducing in many of them the conditions of disease or putrefaction.

When the composite nature of the A. was first discovered, it was supposed to be a chemical combination of nitrogen and oxygen, but further inquiries have rendered this opinion highly improbable. When any two bodies unite with each other chemically, the substance which results from their combination invariably possesses properties which the original constituents did not possess. Now the atmospheric union of oxygen and nitrogen is distinguished by no properties which may not be attributed individually to these gases. We have, then, in this respect, no indication that the atmospheric combination of oxygen and nitrogen is a chemical one. Again, when any composite gas is dissolved in water, the proportion of the ingredients dissolved in it is exactly the same as that in which they occur in the compound itself; but this is not the case with air dis-

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ATMOSPHERIC PRESSURE.—1. Raising a column of water by suction. 2, 3. Pipettes. 4, barreled air-pump. 17, 18. Magdeburg hemispheres. 19. Fall *in vacuo*. 20, 21. 25, 26. Hiero's fountain. 30. Graduated inclined plane. 31. Trajectory or path 36, 37. Compound pendulums. 38. Application of friction. 39. Mariotte's bottle.



Siphons. 6 to 8. Barometers. 9 to 11. Mariotte's law. 12 to 14. Air-pump. 15, 16. Two-ometer in rarefied atmosphere. 22. Mercury air-pump. 24. Air-chamber of force-pump. 31. Projectiles. 32. Centrifugal force. 33. Sling. 34. Gyroscope. 35. Simple pendulum.

solved in water, which is found to be richer in oxygen than atmospheric air. Now, as oxygen dissolves more readily in water than nitrogen, it is manifest that this larger proportion of oxygen arises from both gases acting independently of each other in respect to the water, a condition that would be impossible if they were in chemical union. From these and other corroborative facts, the A. is considered to be simply a mechanical combination of the gases contained in it. This, however, does not prevent the A. from having a uniform composition, as might at first sight be supposed; for when gases are mixed with each other, they intermingle thoroughly throughout the whole space occupied by them. Local causes may temporarily affect the relative proportion of the atmospheric ingredients, but the changes are so minute as to require the most delicate analysis to detect them.

ATMOSPHERIC ELECTRICITY. Franklin was the first to establish the identity of the lightning of the heavens with the electric spark. By his famous kite-experiment, he ascertained that the thunder-cloud assumes an electrical condition precisely similar to that of the conductor of an electrical machine, and that the same mechanical and luminous effects are common, though in a different degree, to both. The attention that was first directed by this discovery to the A. E., as displayed in the thunder-cloud, has since then been extended to the electrical condition of the air in all the different states of the weather. It is now found that the air is sensibly electrical not only when the sky is overcast with thunder-clouds, but when the weather is clear, or when no thunder-clouds are present. Observations on A. E. are made by delicate electrometers connected with insulated rods at the top of the building, or other collecting apparatus. The following are some of the results got by continental observers: When the sky is clear and free from clouds, the A. E. is always positive, and an electroscope exposed to the action of the air is charged with positive electricity. On the other hand, the electricity of the ground is found to be negative. This was shown in a very ingenious way by Volta, who, by catching the fine spray of a fountain on the plate of a straw electroscope, found the straws to diverge with the negative electricity communicated to them by the water, which was necessarily of the same character as that of the ground. It is from this fact that electroscopes, or the collecting apparatus connected with them, must not be overtopped by the neighboring trees or buildings, the negative electricity of which materially affects the indications given, and it is due to the same fact that no A. E. is discovered in the middle of a wood, or in a room, however high the ceiling. Under a clear sky, the potential of the A. E. is found to increase as we ascend, the lower aerial strata being less electrical than the higher. Becquerel proved this by a simple experiment on the plateau of Mt. St. Bernard. On a piece of oiled silk he placed a silk thread, covered with tinsel, one end of which, terminated by a ring, was connected with the rod of a straw electroscope, and the other end was tied to an arrow armed with a metal point. When the arrow was shot horizontally, the straws showed no divergence; but when the arrow was shot upwards, they opened as it ascended, and diverged most when the arrow, in ascending, disengaged the ring from the rod of the electroscope. The same fact is shown in the following way: When a very delicate electroscope is adjusted for any particular position, it will, when elevated a few feet above that position, give indication of positive electricity, and when placed a few feet below, it will be charged negatively. In clear weather, likewise, the A. E. is found to be subject to certain daily periodical variations, and appears to have two maxima and two minima in the course of twenty-four hours. The first maximum takes place a short time after sunrise, and the second shortly after sunset; the first minimum shortly before sunrise, and the second in the afternoon, when the heat of the day is greatest. In cloudy weather, the electroscope is affected sometimes positively, sometimes negatively, and is generally less influenced than in clear weather. The electricity of rain, snow, hail, etc., is sometimes positive, sometimes negative. In Stuttgart, for instance, it was found in the course of a year that the rain was 71 times positive to 69 times negative, and the snow 24 times positive to 6 times negative.

Sir William Thomson, in Great Britain, has made various observations on atmospheric electricity. His delicate electrometers give him not only great facility of observation, but their delicacy far transcends that of any instrument hitherto employed in such observations. Instruments such as his electrometers, that are sensitive to the electro-motive force of a single Daniell's cell with any condensing contrivance, are a wonderful advance in observing power. Sir William's collecting apparatus is an insulated can of water placed inside a window, with a nozzle extending four feet and a half beyond the wall, the window being only open so far as to admit of the nozzle-tube passing without touching. The can, when the stop-cock is opened, assumes the potential of the air outside at the point where the jet breaks up into drops. In the portable electrometer for outside observations, he uses as the collector a burning match at the top of a long rod attached to the instrument. The collecting apparatus is, of course, insulated and connected with the electrometer. He estimates the amount of atmospheric electricity per foot or per inch. He calculates the difference of potential at the perpendicular distance, say, of a foot from any portion of the earth's surface, whether the level ground or an upright wall. He finds, as mentioned above, that the earth is always negative in clear weather, and the air positive, and that the difference of potential per foot is very different at different times. Thus, in the isle of Arran, he found this to vary in ordinary fine

weather from 22 to 44 Daniell's cells; with an e. or n.e. wind, the difference of potentials was from 6 to 10 times that per foot. He also finds sudden and unaccountable variations of potential within even comparatively few minutes, and he can only suggest that there may be cloudless yet cloud-like masses of clear air floating in the atmosphere, which are charged with electricity, and which, in their passage over or near the electrometer, give rise to these marked variations.

The cause of A. E. has given rise to much discussion. The electricity developed by evaporation and vegetation has been thought by some to account for the positive electricity of the air; but this view has been combated, and as yet no theory has been proposed which satisfactorily accounts for it. With the instrument that Sir William Thomson has placed in the hands of observers, and with a cordon of observers all over the world, data may be got for a satisfactory theory, but as yet our knowledge of the subject is too fragmentary to reach anything like a satisfactory account of it. For the electricity of the thunder-cloud, see **LIGHTNING**.

ATMOSPHERIC ENGINE, worked by air-pressure; one was driven by cold air on a small, and hot air on a large piston; one was without heat (see **CALORIC ENGINE**). The A. E. is now worked with compressed air only. Trains on a city railway have been run with an A. E., using air compressed into a strong cylinder and applied like steam in a steam-engine. Condensed steam is used in a similar way, so as to dispense with fire on the streets; in either case the power is taken at a fixed station. An A. E. was used in the mont Cenis tunnel, where the hydraulic power of a cataract near the entrance was used to compress air in reservoirs, whence it was carried in flexible pipes to the rock-drills. The same method was used in working the Hoosac tunnel, in Massachusetts, and is now commonly applied for railway and mining works. The mechanism and operation of the A. E. are almost identical with those of the high-pressure steam-engine. See **ATMOSPHERIC RAILWAY**.

ATMOSPHERIC INFLUENCE, the power of the air over inorganic bodies to affect them chemically, varying in degree with the constituents and condition of the air itself. Normally, 1000 parts of the air contain 208 parts of oxygen and 792 of nitrogen; but many other gases are taken up, so that the air varies widely at places not far apart. Electricity, humidity, and temperature are other disturbing agents. The effect of A. I. is shown on buildings, many fine structures having been speedily ruined by it. Granite, in its order of purity, best withstands it among building stones. Egyptian porphyry is also remarkably enduring. Basalt is disintegrated unequally, according to the amount of feldspar therein. The atmosphere of large towns usually contains an excess of carbonic acid gas, and is hurtful to turpentine in timber or other material. Slate is durable in proportion to its density. Sandstone, millstone grit, or conglomerates are affected through the decomposition of the material cementing their particles, or by the mechanical effect of moisture, as by freezing. Limestone decays with varying degrees of rapidity. A. I. on bricks, tiles, etc., depends on the chemical composition of their material and the amount of baking or burning in their manufacture. If bricks contain lime, they will crack and crumble under moisture. In making cements, the A. I. is carefully studied and guarded against by a proper selection of materials. All timbers are affected easily. If moist and exposed to currents of air, evaporation is rapid and cracks are produced by shrinkage. Dry-rot comes from exposure to high temperature, and consequent imprisonment of natural moisture. Common wet rot is well known to come from air and water combined. The influences of both are greatly lessened by covering the wood with oil paint. Kyanizing, creosoting, and pickling in mineral salts are methods of protecting wood. On metals A. I. is complicated by electro-chemical changes. Iron becomes rusty, that is, the surface is converted into hydrous oxide and will scale off. The more iron is used the less the rusting, as may be seen on comparing a well-worn railway track with a little used siding. Zinc when exposed to air and moisture is rapidly covered with white oxide of zinc, a coating which arrests further oxidation. For this reason, also, galvanizing or plating with zinc is a means of protecting iron. Copper strongly resists A. I.; like zinc, it is soon covered with an oxide that serves as a protection. Lead changes but little in air or water. Glass which is deficient in silica is exposed to decay by the decomposition of its potash and soda. The A. I. causes decay of paintings, statuary, and other works of art, and the destruction of books and manuscripts.

ATMOSPHERIC RAILWAY, a railway on which the locomotive-power is supplied by the pressure of the atmosphere more or less directly on the carriages themselves. The idea of producing railway locomotion in this manner has been successively prosecuted by Lewis, Medhurst, Vallance, and Pinkus; and latterly with a greater prospect of success by Clegg, in connection with Samuda. Vallance patented a plan which proposed the conveyance of passengers along a railway laid within an air-tight tunnel exhausted in front of a carriage working as a piston, the pressure of the atmosphere acting on the carriage from behind. This plan was made public in 1825, and ultimately brought into experimental operation at Brighton, proving the possibility of such a mode of transit. The general opinion as to its merits was, that though it might succeed in the transmission of goods, or, with a smaller tube than the tunnel, might suit well the conveyance of the mails, it could not be expected to enjoy the favor of the traveling public, on account of

its dark close tunnel. Thus the subject of atmospheric railways had ceased to attract attention, when the curiosity of the public was again called to it, by the proposal of another plan of propulsion, by Henry Pinkus, an American gentleman, resident in England, who took out a patent for it about the year 1835, under the name of the pneumatic railway. The apparatus for this was to consist of a cast-iron tube of about 40 in. diameter, having a slit of about 2 in. wide on its upper side, the slit (which was covered by a flexible flap or valve) furnishing an opening through which the mechanism of a piston working within the tube might be connected with that of the leading carriage without. See **LOCOMOTIVE, COMPRESSED AIR**.

Under improved arrangements of the details, Messrs. Clegg and Samuda made an experiment of this plan in 1840, on a part of the line of the West London railway; and so favorable was the issue, that the directors of the Dublin and Kingstown railway adopted the atmospheric pressure system for a projected extension of their line from Kingstown to Dalkey. Accordingly, parliamentary sanction was obtained for the line, and the first A. R. was in full operation at the beginning of the year 1844. In that year the London and Croydon railway company began to lay down a line of A. R. alongside of their locomotive line from London to Croydon. The South Devon railway company also adopted the atmospheric mode of working on a part of their railway. Both of these lines, however, were shortly afterwards abandoned as unsatisfactory.

The result of these trials has clearly shown that the A. R. system cannot stand in competition with that of the locomotive engine, unless, perhaps, in some very peculiar situation. The expense and care necessary to keep the tube with its valve in good working-order, led to the removal of the atmospheric mechanism from the various railways on which it was established; so that the history of A. R. may be ranked under the chapter of failures. They survive only in the form of pneumatic dispatch tubes, which are used largely in London (in connection principally with the telegraph service), for the conveyance of parcels or messages. See **PNEUMATIC DISPATCH**.

ATOLL', the name given by the Malays to a coral reef which forms an annular island, inclosing a lake of water which is connected with the sea by an open strait. Some A. are nearly 100 m. in circumference, and have from 15 to 60 fathoms of water. They make excellent harbors, with safe entrances, always on the windward side. Some of the reefs sustain considerable vegetation, and are inhabited.

ATOM (Gr. *atomos*, an indivisible particle; from *a*, not, and *temnō*, I cut). In ancient philosophy, two theories of the nature of matter were recognized, and these have continued to form subjects of argument among speculative men since the year 510 B.C. to the present time. The one theory is that matter is infinitely divisible. Thus, a needle may be divided into two, and each of the parts may in its turn be broken or cut into two, and each of the latter again and again be subdivided, till the parts become so small that it may be impossible to see them by the naked eye; but these parts are regarded as capable of still further division, without limit or stoppage, provided more perfect or delicate means could be employed to act upon them. The second theory regarding the constitution of the matter is that in the repeated division and subdivision of a solid, liquid, or gas, a point will be at length reached when it will no longer be possible, by any conceivable means, to break a molecule in two, the molecule being a real unity, not composed of separate parts—in other words, an *atom*. The latter theory recognizes the finite divisibility of matter, and considers that all matter is more or less compactly built up of myriads of atoms aggregated together, and having spaces or pores between the several atoms or particles. If it were possible to subject such matter to the scrutiny of a sufficiently powerful magnifying-glass, or microscope, and thus exhibit or behold the atoms so separated by spaces, then an appearance would be presented similar to that which the painter chooses to depict on the canvas when he is representing a snow-storm, and where every little flake of snow is separated from its neighbor one by a space in which there are none; or that which would be observed if, during a hail-storm, some great power were to cry, "Halt!" and that instant every minute hail-stone was arrested in the spot it had reached.

This view of the physical nature of matter is that which is known as the *atomic* or *corpuscular theory*, and has in modern times received some support from the facts embodied in the chemical atomic theory originated by Dalton. Granting, however, that the chemist can prove that his simple and compound forms of matter are built up of chemical atoms, the problem still remains to be solved as to the possible identity of physical and chemical atoms. What the chemist regards as an A. in his science, may not be an ultimate and indivisible A. in a physical point of view; the chemical A., though incapable of division as a chemical A., may still be composed or built up of many physical atoms, and may be capable of being subdivided into such. Indeed, whilst the atomic theory of Dalton, when first announced, was eagerly seized upon as the best possible evidence for the existence of both chemical and physical atoms, the tendency of recent researches and discussions in chemistry has been to show that the chemical A. is different from the physical, and does not necessitate the existence of the latter. See **ATOMIC THEORY**. According to the ordinary acceptance of the term, it is a molecule of matter having a definite weight, magnitude, and form, possibly alike for the atoms of the same material, but differing in those of

different substances. The form of an A. is supposed by some men of science to be the same as that which the fragments of a substance assume when it is split in the direction of the planes of the cleavage of its crystals (see CRYSTALLOGRAPHY), but a more general belief has been that all atoms are spherical, and that the various crystalline forms are produced by the manner in which the atoms are grouped together. In regard to the size of atoms, Sir William Thomson has shown, by three entirely different trains of argument from observed facts, that the diameter of an A. cannot be greater than $\frac{1}{100,000,000,000}$ nor less than $\frac{1}{5,000,000,000,000}$ of an inch. Further considerations regarding atoms will be found under the head Matter (q.v.); also in the article Vortex (q.v.).

ATOMIC THEORY. Analysis shows that compound bodies contain certain elements (see CHEMISTRY) in certain proportions. These proportions have been minutely and carefully examined by many chemists since the time when the balance was first applied to chemical investigation, and it has been proved that the respective quantities of each of the combining elements are not dependent entirely upon external conditions, but are regulated by certain laws. These laws were partially observed and discussed by earlier chemists and physicists, but it was reserved for Dalton (q.v.) to systematize the somewhat incoherent labors of his predecessors, and to announce, in positive language, the four laws which regulate the union of various kinds of substances, and which are still acknowledged by chemists as the LAWS OF COMBINING PROPORTION, or the atomic theory. These laws regulate the combination of unlike substances by *weight*, and not by *volume*; and they are based upon the preliminary acknowledged fact, capable of experimental demonstration, that the same compound substance is always composed of the same ingredients or elements.

The *first law* of combination by weight comprehended under the A. T. is THE LAW OF CONSTANT PROPORTION, which teaches that the elements or ingredients which form a chemical compound are always united in it in the same proportion by weight. Thus, water, which consists of oxygen and hydrogen, does not contain one or both of these elements in indefinite amount, but it is invariably made up of 8 parts by weight of oxygen to 1 part by weight of hydrogen. It makes no matter whether the total amount of either element be represented by grains, ounces, pounds, or tons, it will always be found that the proportion of 8 parts of oxygen to 1 part of hydrogen is kept up. Neither does the source of the water make any difference, for pure water obtained from rain, snow, or hail, the river or the sea, the sap of plants or the juices of animals, invariably contains the same elements in the same proportions. Again, common salt (chloride of sodium), whether it be obtained from sea-water, salt-springs, rock-salt, or even the blood of animals, always consists of chlorine and sodium in the exact and never varying proportion of $35\frac{1}{2}$ parts of chlorine to 23 parts of sodium. Whilst the law of constant proportion teaches us that the same compound is always built up of the same ingredients in the same proportion, it does not necessarily follow that the same elements or components in the same proportions will invariably form the same compound body. It is far otherwise; and many examples can be obtained, especially from organic chemistry, where the same components in the same proportions produce very different substances. Thus, starch and cotton (lignine)—very dissimilar substances—consist of carbon, hydrogen, and oxygen in the very same proportions; and gum-arabic and cane-sugar are similarly circumstanced. See ISOMERISM.

The *second law* is the LAW OF RECIPROCAL PROPORTION, which tells us that the proportions in which two substances unite with a third have a simple arithmetical relation to that proportion in which they unite with each other. Thus oxygen and hydrogen unite in the proportion of 8 to 1 to form water. Carbon and hydrogen are present in olefiant gas in the proportion of 6 to 1, and oxygen and carbon unite in the proportion of 8 to 6 to form carbonic oxide. Again we have a compound of oxygen and iron containing these elements in the proportion of 8 to 28; we have also a compound of sulphur and iron in the proportion of 16 to 28; and sulphur and oxygen unite together to form sulphurous acid gas, which contains equal weights of the two elements—the proportion of 1 to 1 having a simple arithmetical relation to the proportion 8 to 16.

Numbers representing the proportions in which the elements combine (such as 1 for hydrogen, 8 for oxygen, 6 for carbon, 16 for sulphur, 28 for iron, etc.), are called their "combining proportions," or *atomic weights* (q.v.). It is obvious that analysis alone cannot enable us to fix definitely such numbers. There is nothing in the *composition* of their compounds to lead us to adopt the proportional numbers given above for hydrogen, oxygen, carbon, sulphur, and iron, rather than simple multiples or sub-multiples of them. In fact, the numbers adopted by Berzelius, and now reintroduced, are in the proportion—hydrogen 1, oxygen 16, carbon 12, sulphur 32, iron 56. The reasons for preferring certain particular numbers to any multiples or sub-multiple of them will be found in the article CHEMISTRY.

The *third law* is THE LAW OF MULTIPLE PROPORTION, which is, that when one substance combines with another in several proportions, the higher proportions are multiples of the first or lowest. Thus, hydrogen unites with oxygen in two proportions: as 1 of hydrogen to 8 of oxygen, when ordinary pure water is the result of union; and as 1 of

hydrogen to 16 of oxygen, when peroxide of hydrogen, a powerful bleaching agent, is produced—the difference in the respective amounts of the oxygen—8 and 16—being that the latter is a multiple of the former by 2. Again, carbon unites with oxygen in two proportions: as 6 of carbon to 8 of oxygen, when the inflammable gas, carbonic oxide, is formed; and as 6 of carbon to 16 of oxygen, when the non-inflammable gas, carbonic acid, is the result. The variation in this instance is, that the oxygen is present in the one case as 8, and in the other as a multiple of that number by 2, viz. 16. One of the best illustrations of this law occurs in the case of the union of nitrogen and oxygen: 14 parts of nitrogen can unite with 8 of oxygen, and thus form laughing-gas; but the same amount of nitrogen can combine with 16, 24, 32, or 40 of oxygen—in the latter case constituting anhydrous nitric acid—all of the higher numbers being multiples of the first or lowest, viz. 8 by 2, 3, 4, and 5.

The *fourth law* IS THE LAW OF COMPOUND PROPORTION, which teaches that the combining proportion of a compound substance is the sum of the combining proportions of its components. Thus, the compound body, carbonic acid, which consists of 6 of carbon united with 16 of oxygen, has the combining proportion 22, which is the sum of the combining proportions of the carbon and oxygen composing it, viz. $6+16=22$. Similarly, the compound substance lime contains 20 of the metal calcium combined with 8 of oxygen, and has the combining proportion of $20+8$ or 28. When carbonic acid and lime are linked together, as in marble, which is the carbonate of lime, then they are united in the proportion of 22 parts of carbonic acid and 28 of lime. Not only is 22 the proportion in which carbonic acid will combine with lime, but it is the proportion in which it will form compounds with every other substance of similar chemical constitution.

The preceding laws regulating the union of substances by weight have been obtained by comparing together the results of numerous experiments, and every careful analysis serves to confirm their accuracy. But Dalton's theory was not limited to the statement of these laws; it was also an attempt to explain them. It assumes that each elementary substance consists of extremely small indivisible particles or atoms; that the atoms of any one element are all exactly alike, but differ from the atoms of every other element. Among other points of difference, they differ in weight, and although the absolute weight of an atom is unknown, the weights of two atoms, one of one element, the other of another element, are in the proportion of the combining weights of the elements they belong to. Thus the combining weight of sulphur is twice that of oxygen: we do not know the absolute weight of an atom of either, but the A. T. assumes that each atom of sulphur is twice as heavy as an atom of oxygen. Further, Dalton's theory assumes that the ultimate particles of compound bodies contain a comparatively small number of atoms of the component elements. It is easy to see how this theory explains the laws enunciated above. We must, however, remember that while the theory satisfactorily explains the laws, the laws do not prove the theory. It is quite conceivable that such laws might exist, although matter did not consist of atoms. The A. T., however, rests not only on a chemical but also upon a physical foundation. According to the modern molecular theory, matter consists of small particles, each of which is in motion, and this motion is the more rapid the hotter the substance is. These small particles or "molecules" cannot be broken up without changing the character and properties of the substance. They are not, however, *atoms*. In the case of compounds, as the molecules of any one substance are all similar to one another, each molecule must contain all the components; and in many elementary substances it can be proved, assuming the truth of the molecular theory, that each molecule consists of several similar atoms. A molecule, then, is either a single atom, as in *some* elementary substances, or a group of atoms which remain together during those movements which depend on the temperature of the substance. Now, the velocity of these motions increases as the temperature is raised; when, therefore, the temperature is raised so high, and the velocity of the molecules becomes so great that the collision of the molecules with one another is sufficiently violent to break them up and separate their constituent atoms, the substance is decomposed, the atoms rearranging themselves into new groups (or molecules) capable of remaining unbroken under the new conditions. This explains the decomposition of compounds by the action of heat.

When the temperature is not so high, and the violence of collision insufficient to break up the molecules, these are merely shaken, thrown into a state of vibration, and thus the hold of the atoms upon each other is loosened. Now, if two substances are mixed together, it may happen that some atoms in the one set of molecules are so attracted by some atoms in the other set, that, when a molecule of the one set meets one of the other set in a vibrating or loosened condition, an exchange of atoms may take place between them, or each may lose a part of its atoms, these going to form a new molecule. This gives an explanation of the action of one substance upon another, and further shows why, in general, a certain temperature is required in order that the action may take place.

Gay Lussac first pointed out that a relation exists between the density of a gas and its atomic weight. Avogadro greatly simplified the statement of these relations by announcing the law of molecular volumes of gases, a law which Prof. Clerk Maxwell has since proved to be a necessary consequence of the molecular theory of gases. This

law is, that a given volume of gas at a given temperature and pressure contains the same number of molecules whatever be the nature of the gas.

From this law, to which we may give the name of "Avogadro's law," and from Boyle's law, and the law (often called Charles's law) that the volume of a gas is directly proportional to the absolute temperature—that is, to its temperature reckoned from a point 273° centigrade below the freezing-point of water—it follows that the volume occupied by a given mass of a gas is a function of the pressure, the temperature, and the molecular weight of the gas; understanding by the "molecular weight" of a substance a number M , such that $M : 2 ::$ the absolute weight of a molecule of the substance: the absolute weight of a molecule of hydrogen. The number 2 appears in this proportion because we assume the *atom* of hydrogen as our unit, both of atomic and of molecular weight, and it can be proved (see CHEMISTRY) that the molecule of hydrogen gas consists of two atoms. If, then, P be the pressure in millimeters of mercury at 0° C; t , the temperature of the gas, as indicated by a centigrade thermometer; M , the molecular weight of the substance; and V , the volume (in cubic centimeters) occupied by a gramme of the gas, $V = \frac{760}{P} \times \frac{t + 273}{273} \times \frac{22400}{M}$. In the gaseous state,

the average distance between the molecules, although extremely small, is great compared with the size of the molecules, so that the volume of the gas depends almost exclusively upon the distance between the molecules: it is not so in the case of solids and liquids, in which the molecules are so closely packed as to be almost always in contact. The volume occupied by solids and liquids depends, therefore, far more upon the *atoms* of which the substance is made up, than upon its *molecular* structure. For further recent modifications of the atomic theory, see CHEMISTRY.

ATOMIC VOLUMES. See ATOMIC THEORY above, and CHEMISTRY.

ATOMIC WEIGHTS are the proportions by weight in which the various elementary substances unite together. It is necessary that one element be selected as the starting-point of the series, and an arbitrary sum affixed to it, and thereafter all the other elements can have their sums awarded to them, according to the proportional amounts in which they combine with each other. The *second law*, mentioned under the Atomic Theory (q.v.), explains the manner in which this can be done, and how far the numbers are arbitrary. In all systems of atomic weights in modern use, the atomic weight of hydrogen is taken as unity, and the atomic weights of the other elements are then fixed, so as to give on the whole the simplest and most consistent formulæ for their compounds.

There are two systems of atomic weights at present in use. 1st, The "old" system, which, after a good deal of discussion, was generally adopted about 1845; and 2d, The new system, which is, in many respects, a revival of the system of Berzelius, and which may be said to have come into general use by scientific chemists about 1860.

The subjoined table gives the names of the elements, their chemical symbols, and their atomic weights, according to these two systems. The reader is referred, for the reasons for the change of atomic weights, to the article CHEMISTRY.

ELEMENTARY SUBSTANCES, WITH THEIR SYMBOLS AND ATOMIC WEIGHTS.

Name of Element.		Atomic Weights.		Name of Element.		Atomic Weights.	
		Old.	New.			Old.	New.
Aluminium.....	Al	13.7	27.0	Molybdenum.....	Mo	48.0	96.0
Antimony (Stibium).....	Sb	122.0	120.0	Nickel.....	Ni	29.5	58.6
Arsenic.....	As	75.0	75.0	Niobium.....	Nb	94.0	94.0
Barium.....	Ba	68.5	137.0	Nitrogen.....	N	14.0	14.0
Bismuth.....	Bi	208.0	208.0	Osmium.....	Os	100.0	193.0
Boron.....	B	11.0	11.0	Oxygen.....	O	8.0	16.0
Bromine.....	Br	80.0	80.0	Palladium.....	Pd	53.0	106.0
Cadmium.....	Cd	56.0	112.0	Phosphorus.....	P	31.0	31.0
Cæsium.....	Cs	133.0	132.7	Platinum.....	Pt	99.0	194.3
Calcium.....	Ca	20.0	40.0	Potassium (Kalium).....	K	39.0	39.0
Carbon.....	C	6.0	12.0	Rhodium.....	Rh	52.0	104.0
Cerium.....	Ce	46.0	140.0	Rubidium.....	Rb	85.4	85.2
Chlorine.....	Cl	35.5	35.4	Ruthenium.....	Ru	52.0	104.4
Chromium.....	Cr	26.0	52.4	Samarium.....	Sa		150.0
Cobalt.....	Co	29.5	59.0	Scandium.....	Sc		44.0
Copper (Cuprum).....	Cu	31.7	63.2	Selenium.....	Se	39.5	79.0
Didymium.....	Di	47.5	144.0	Silicon.....	Si	14.0	28.3
Erbium.....	E	56.3	166.0	Silver (Argentum).....	Ag	108.0	107.6
Fluorine.....	F	19.0	19.0	Sodium (Natrium).....	Na	23.0	23.0
Gallium.....	Ga		69.9	Strontium.....	Sr	43.8	87.3
Germanium.....	Ge		72.3	Sulphur.....	S	16.0	32.0
Glucinum (Beryllium, Be).....	G	4.7	9.1	Tantalum.....	Ta	182.0	182.0
Gold (Aurum).....	Au	196.0	197.0	Tellurium.....	Te	64.0	125.0
Hydrogen.....	H	1.0	1.0	Thallium.....	Tl	204.0	303.6
Iodine.....	I	37.3	113.4	Thorium.....	Th	57.8	231.8
Iridium.....	Ir	127.0	126.5	Tin (Stannum).....	Sn	59.0	118.0
Iridium.....	Ir	99.0	192.5	Titanium.....	Ti	25.0	48.0
Iron.....	Fe	28.0	56.0	Tungsten (Wolfram).....	W	92.0	183.6
Lanthanum.....	La	46.0	138.5	Vanadium.....	V	60.0	240.0
Lead (Plumbum).....	Pb	103.5	206.4	Vanadium.....	V	51.3	51.2
Lithium.....	Li	7.0	7.0	Ytterbium.....	Yb		173.0
Magnesium.....	Mg	12.0	24.0	Yttrium.....	Y	30.8	89.6
Manganese.....	Mn	27.5	55.0	Zinc.....	Zn	32.5	65.0
Mercury (Hydrargyrum).....	Hg	100.0	200.0	Zirconium.....	Zr	44.8	90.8

ATOMIC WEIGHTS. See CHEMISTRY, and ELEMENTS. CHEMICAL.

ATOMISTS. See DEMOCRITUS, LEUCIPPUS, EPICURUS.

ATONEMENT. Sin violates the ground of union which the personal creature has, by nature, with the holy God. The act of sin is one of separation; the act begets the state of sin, the state confirms and repeats the act. The doctrine of the A. treats of the mediation necessary for restoring the union between God and man, which has been lost by sin. The A., therefore, must ever be the fundamental doctrine in every religion of sinful creatures. In the Christian religion, it manifestly occupies this central position; for the Christian doctrine of the A. is but the explanation of its great historic fact—the embodiment in one person of the divine and human natures in perfect agreement. In the person of Christ, God and man are atoned: he is their atonement.

So fundamental is the doctrine of the atonement in the Christian religion, that it does not, like many other doctrines, form a ground of distinction among the different bodies into which the Christian world has been divided. All churches may be said to be equally orthodox on this point. The church of Rome, the Greek church, the various Protestant churches—established and dissenting—all agree, taking their standards as a criterion, in resting the sinner's hope of salvation on the mediatorial work or A. of Jesus Christ. Nevertheless, there have been from the very beginning of speculative Christian theology, and still continue to be, within the bosom of the several churches, various ways of conceiving and explaining the exact nature and mode of operation of this mediatorial work. What follows is a brief sketch of the historical development of these speculations.

Christianity differs from heathenism in the clear perception which it has of the antagonism sin has introduced between God and man. Heathenism but vaguely conceives of this variance, and consequently has but an ill-defined notion of the atonement required, the notion seldom containing more than the idea of a reconciled union of the individual man with nature and the universal life. Even where its mythical divinities assume personality, it is but an ideal personality without any concrete reality of life, and consequently without any real significance for the conscience. In this state, the abject subjection of man to nature prevents his rising into that sphere of conscious freedom which makes sin sinful, and demands an A. with one who is Lord both of nature and man.

In Judaism, man stands above nature, in conscious relation to a personal God, whose written law exhibits the requirements of his relationship with man—requirements which are never met, and which only make him fearfully conscious of the ever-widening breach between him and his God. Thus the law awakened the sense of guilt, and the desire for an A.; a desire it could never satisfy. The never-ceasing demands of these ever-unfulfilled requirements were constantly acknowledged by its whole sacrificial *cultus*, which expressed the hidden ground of Jewish hope, and prophetically pointed to its future manifestation.

But whilst the holy Scriptures, throughout the Old Testament, exhibit the making of an A. by vicarious sacrifice (Lev. xvi. 21; xvii. 11), and the idea, both of the suffering and the deliverance of many by the sins and virtues of one, was common to all antiquity, the idea of the suffering and vicarious Messiah, plainly declared in the writings of the prophets (Luke xxiv. 46; Isaiah liii.; Psalms xxii.), and not entirely hidden from the more thoughtful and devout contemporaries of Jesus (Luke ii. 34; John i. 29), was one which was foreign to the Messianic faith of the great body of the people.

In the New Testament, Christ is everywhere exhibited as one sent from God for the salvation of the world (John iii. 16, 17); and as the condition, on the part of man, of his obtaining this salvation, we read of the requirement of repentance, faith, and reformation (Matt. iv. 17; v. 3, 11; vi. 12; Mark xvi. 16; Luke xv. 11), whilst, on the part of God, as conditioning and mediating his forgiveness of sins, we have exhibited the entire life of Christ upon earth conceived of as embracing severally its individual features (Acts v. 31; Rom. iv. 25; viii. 34); but more especially his death as a ransom for our sins (Matt. xx. 28; xxvi. 28), as a vicarious sacrifice (1 Peter i. 19; 2 Cor. v. 21), by which we are redeemed from the bondage of sin (1 Tim. ii. 6; Gal. iii. 13; 2 Peter ii. 1), and obtain forgiveness (Rom. v. 19; 1 Cor. xv. 3; 1 John i. 7), and eternal life and peace with God (John x. 11; Col. i. 20). Christ is therefore the Mediator between God and man (1 Tim. ii. 5), having made peace through the blood of his cross (Col. i. 20); the propitiation for our sins (1 John ii. 2; iv. 10); and our high-priest who offers himself a sacrifice to reconcile us with God (Heb. ii. 17; v. 1; ix. 28).

In accordance with this full and explicit teaching of holy Scripture, we find that the sufferings and death of Christ were ever regarded as of primary and essential importance in his work of redemption; but notwithstanding this, we look in vain throughout the early centuries of the Christian church for anything like a systematic development of the doctrine of the A. The germs of the doctrine existed, but without any logical connection or clearness. "On this head there has been a twofold mistake—sometimes the existing beginnings of many later elaborated dogmas have been overlooked; or, on the other hand, it has been attempted to point out with literal distinctness church doctrines as if already developed." The early church fathers dwell with a sort of inspired devotion upon those facts of the gospel which represent Christ as the sacrifice for our sins, as the ransom paid for our redemption, as our deliverer from the power of Satan, as the restorer to mankind of whatever was lost by the fall of Adam; but they seldom attempt to show

how these blessed results connect themselves with the sufferings and death of Christ; neither do they show in what manner the A. has objectively been made, nor how it is brought to the experience of its individual subjects.

The narrow limits of this article will not allow us to specify the many ways in which the sufferings and death of Christ were regarded in relation to their A. for sin. During the first four centuries there appeared no certainty of opinion as to whether they were a ransom-price paid to God or to the devil. The latter supposition is the more prevalent, and is shared in by Origen and St. Augustine. Gregory of Nyssa explains this opinion by saying that the devil consented to receive Jesus as a ransom, because he regarded him as more than an equivalent for all those under his power; but that, notwithstanding his subtilty, he was outwitted, for, owing to the humiliation in which Christ was veiled, he did not fully recognize him as the Son of God, and consequently was himself deceived. But having consented to receive him as a ransom for mankind, he was righteously deprived of his dominion over man, whilst he could not retain Jesus when he discovered him to be the holy one of God, being horrified and tormented by his holiness.

Athanasius first of all successfully controverted this notion, and maintained that the ransom was paid to God. He argued that as God had threatened to punish transgressors with death, he could but execute his threat. But then it was not becoming the character of God to allow his purpose in the creation of man to be frustrated by an imposition practiced upon him by the devil. The only expedient, therefore, which remained for his deliverance from death, was the incarnation and sacrifice of the Logos in his stead, by which the justice and veracity of God would be maintained, man delivered, the law fulfilled, and the power of the devil broken. It has often been stated that Tertullian uses the term satisfaction with respect to Christ's A. for sin, but this is incorrect, for although he employs the term, he never does so in the sense of a vicarious satisfaction, but only in the sense of making amends for our own sins by confession and repentance.

These elemental and mythical conceptions of the doctrine of the A. remained in a most imperfect and altogether undeveloped condition, until the acute and subtle genius of the Piedmontese archbishop of Canterbury reduced them to order, and presented them in logical consistency. We must regard Anselm, therefore, as the author, at least as to its form, of the doctrine of vicarious satisfaction, which, under various modifications, has ever since continued to be held as the orthodox doctrine of the church. The following is, in all essential respects, his statement of the doctrine: The infinite guilt which man had contracted, by the dishonor of his sin against the infinitely great God, could be atoned for by no mere creature; only the God-man Christ Jesus could render to God the infinite satisfaction required. God only can satisfy himself. The human nature of Christ enables him to incur, the infinity of his divine nature to pay, this debt. But it was incumbent upon Christ as a man to order his life according to the law of God; the obedience of his life, therefore, was not able to render satisfaction for our guilt. But although he was under obligation to live in obedience to the law, as the Holy One he was under no obligation *to die*. Seeing, then, that he nevertheless voluntarily surrendered his infinitely precious life to the honor of God, a recompense from God became his due, and his recompense consists in the forgiveness of the sins of his brethren.—In this form of the doctrine we are taught the necessity of an active vicarious satisfaction; but Anselm nowhere teaches the passive satisfaction, he nowhere says that Christ endured the punishment of men. Nor do we find in his writings the development of the subjective side of the doctrine—namely, how the satisfaction rendered to God mediates the A. in the experience of the believer.

Subsequent to the time of Anselm, and prior to the reformation, there are two views of the A. which divide the opinions of this period: the one regarding the peculiar manner in which it was accomplished as absolutely necessary, and deriving its efficiency from its objective nature; the other supposing a subjective connection between the sufferings of Jesus and the price of redemption, because this was best fitted to effect the moral transformation of men. According to Anselm, the satisfaction rendered by Christ was greater than the guilt for which he atoned; and it needed to be greater, for the payment of the debt due to God gave men no claim to the favor of God. Thomas Aquinas and his followers maintained Augustine's opinion of the infinite value of the blood of Christ rendering it more than sufficient; while the Scotists maintained that it was sufficient only because God was pleased to regard it as sufficient. But in the period between Anselm and the reformation, little or no progress was made in the development of this doctrine.

We now come to the period of the reformation, when the objective speculations of the schoolmen are brought under the subjective requirements of human souls, and the doctrine of the A. is viewed in this light. In the writings of Luther, one will only with difficulty arrive at his intellectual apprehension of this doctrine in its scientific form; but setting out with the consciousness of sin, one will everywhere discover how he realized that in Christ all sin is "vanquished, killed, and buried, and righteousness remaineth a conqueror and reigneth forever." The following is an outline of the Lutheran doctrine, as laid down in the *Concordienformel*: It is alone by faith we can receive the blessings presented to us in the gospel by the Holy Ghost. Faith justifies, because it appropriates the merit of Christ. Therefore, the righteousness which is imputed to the believer, simply by the grace of God, is the obedience, the suffering, and the resurrection of

Christ, by which he has satisfied the claims of the law, and atoned for our sins. For as Christ is not merely man, but God and man in one person, he was, as Lord of the law, no more subject to it than he was subject to suffering and death. For this reason, his twofold obedience—that which he rendered, on the one hand, by his suffering and death; and, on the other, by his righteous fulfillment of the law on our behalf—is imputed to us, and God acquits us of our sins, and regards us as just, in view of his complete obedience in what he did and suffered. This obedience embraces the entire existence of Christ upon earth, and is so complete that it fully covers the disobedience of men, so that it is not reckoned against them for condemnation. Christ is our righteousness, therefore, only in so far as in his entire person the most perfect obedience is exhibited, which he was able to render in that he was neither God alone nor man alone, but both in one, God and man.

According to Calvin: if one asks how Christ has reconciled us with God, and purchased a righteousness which made him favorable to us, it may be answered generally, that he accomplished this by the whole course of his obedience. But although the life of Christ is to be regarded as paying the price necessary for our deliverance, the Scriptures ascribe our redemption especially to his death. Calvin attached great importance to the particular mode of his death—any other mode of death would not have rendered the same satisfaction to God. He, however, says little or nothing about Christ's fulfilling the law for us, but dwells upon his delivering us from its curse. He does not, therefore, exhibit his active obedience separated, as an essential part of his satisfaction for sin, from his passive obedience. The importance attached to the obedience of his life arises from its natural and necessary connection with his suffering and death. And the great importance attached to his death is drawn rather from the view of its subjective necessity, than from the idea of the divine righteousness—namely, that without such a death there would have been no sufficient ground for the subjective realization of deliverance from sin and guilt. Calvin's view differs from that of the Lutheran *Concordien-formel* in that he does not regard the relationship of God to man merely from the stand-point of punitive and satisfying righteousness, which always leads to the merely negative notion of a Redeemer from guilt and punishment, but looks upon Christ as the highest Mediator, through whom the nature of God is communicated to man. There was a necessity for Christ's incarnation, not merely because, apart from the suffering of the God-man, the divine righteousness could not be atoned, but also because, without such a divine Mediator, there could be no vital relation between God and man. "Had man remained free from all taint, he was of too humble a condition to penetrate to God without a Mediator."

While the reformers established the doctrine of the A. on the theory of Anselm, and extended it so as to make the sufferings of Christ include the divine curse, and introduced distinctions between Christ's active and passive obedience, Socinus endeavored to prove the falseness of Anselm's theory. He shares with the Protestants the subjective principle, which the period of the reformation established, but developed it in a one-sided manner. Socinianism represents man as attaining to oneness with himself and with God by his own moral energy. It rejects that idea of the righteousness of God which makes it impossible for him to forgive sin without satisfaction, as imposing finite limitations upon the divine Being; and also objects to the doctrine of satisfaction, on the ground that satisfaction for sin and forgiveness of sin are incompatible with each other; and, moreover, objects that sin and punishment are of so personal a nature as not to allow of their being transferred. It further opposes the doctrine of the active and passive obedience of Christ, on the ground that the one excluded the other. Another objection maintained the actual impossibility of Christ's rendering the supposed satisfaction for sin.

The doctrine it sought to establish in the place of the one it attempted to overthrow may in brief be stated as follows. Man is reconciled to God by repentance and reformation. Only from an act of man changing his disposition, and not from an act of God changing his relation to man, follows his reconciliation with God. God is in himself ever the same towards man—reconciled from all eternity; man alone has to assume a new relation; as soon as he does this, he is immediately reconciled; by this act of his will, he is at one with God. Only in man's moral state is there any obstacle to his reconciliation. This greatest and holiest accomplishment, the reconciliation of man with God, is achieved by an act of his will.

In this purely subjective theory, repentance occupies the place of faith in the orthodox doctrine, and faith becomes identical with obedience; for repentance and reformation are regarded as but the two sides of the same act of the will. It follows from this that justification is of works as well as reconciliation. A necessity for the sufferings of Christ is shown for the following objects—that he might become our example; better fitted to render us help; that we might have a pledge and guarantee of the divine forgiveness; and as conditioning his resurrection and ascension to glory.

We must now hasten to the form of this doctrine among "modern Calvinists," without attempting further to exhibit the links in the chain of its historic connection. "Modern Calvinism" represents the A. as that satisfaction for sin which was rendered to God, in his public character as moral governor of the world, by the perfect obedience unto death of our Lord Jesus Christ. The nature of this satisfaction was a moral, not a

pecuniary satisfaction. It preserves to the moral government of God its authority, whilst its tendency is to secure the forgiveness of sin. The value of the sufferings of Christ consists in their tendency to uphold the divine moral government unimpaired whilst pardon is extended to those who have violated it, rather than in their intrinsic excellence, which, though essential to, did not constitute their value. There was a moral necessity for Christ's sufferings and death—obstacles to the bestowment of pardon had to be removed—the influence of the Holy Spirit had to be secured. The whole contents of Christ's earthly existence, embracing both his active and passive obedience—a distinction which is unsupported by the word of God—must be regarded as contributing to the A. which he made. Of the actual sufferings of Christ immediately attending his death, it would be unpardonable to speak with confidence, so little has been revealed. It may, however, be considered whether the Savior's deprivation of his Father's countenance may not have been indirectly caused rather by his awful and afflicting sense of the evil of sin, than otherwise?—As to the "extent" of the A., there is a broad distinction to be made between the *sufficiency* of the A., and its *efficiency*. It may be true that Jehovah did not intend to exercise that influence of the Holy Spirit upon all which is necessary to secure the salvation of any one, but as the A. was to become the basis of moral government, it was necessary that it should be one of infinite worth, and so in itself adequate to the salvation of all. The body called Universalists (q.v.) hold both the efficiency and ultimate sufficiency of this great event in history.

The foregoing represents the modified view of the doctrine as advocated by Dr. Payne, and as held, in all essential respects, by such men as Pye Smith and Wardlaw, which in its earlier form, and as found in the writings of Owen and Edwards, maintains that the A. was made only for the elect; and that its necessity with respect to them arose out of the eternal justice of God, which required that every individual should receive his due desert; and, consequently, that the sufferings of Christ were the endurance of punishment equivalent in amount of suffering, if not identical in nature—as Owen maintains—with that to which the elect were exposed; and, moreover, that the meritorious obedience of Christ in fulfilling the law, imputes a righteousness to those for whom the A. secures salvation, which gives them a claim to the reward of righteousness.

Our space will not allow us to present to the reader the various forms which this doctrine is made to assume in the philosophic theology of Germany from Kant to the present time. See NEANDER. We must, therefore, confine ourselves to the presentation of those views of the doctrine advocated by our own countrymen in our own time, which may fairly represent the present state of opinion with respect to this fundamental doctrine.

Let us begin with the view of modern Unitarianism, which may very clearly and fairly be presented in the words of one of the most able of its advocates, the Rev. Prof. John James Tayler: "There is *one* mediator between God and men, the man Christ Jesus.' This can only refer to unrivaled pre-eminence, not to exclusive function. For all higher minds do, in fact, mediate between their less gifted fellow-creatures and the great realities of the invisible world. This '*one*' is a *human* mediator, 'the man Christ Jesus'—not a being from another sphere, an angel or a God—but a brother from the bosom of our own human family. 'He gave himself a ransom for *all*' who embrace his offers and will hearken to his voice. He brings from God a general summons to repent; and with that he conveys, through faith, a spiritual power to shake off the bondage of sin, and put on the freedom of a new heart and a new life. He is a deliverer from the power of sin and the fear of death. This is the *end* of his mediation. This is the redemption of which he paid the price. His death, cheerfully met in the inevitable sequence of faithful duty, was only one among many links in the chain of instrumentalities by which that deliverance was effected. It was a proof, such as could be given in no other way, of trust in God and immortality, of fidelity to duty, and of love for mankind. In those who earnestly contemplated it, and saw all that it implied, it awoke a tender response of gratitude and confidence, which softened the obdurate heart, and opened it to serious impressions and the quickening influences of a religious spirit."

Prof. Jowett advocates an opinion peculiarly his own, if, indeed, language so confessedly vague and indefinite can be said to embody an *opinion*. It is this: "that the only sacrifice, A., or satisfaction with which the Christian has to do, is a moral and spiritual one; not the pouring out of blood upon the earth, but the living sacrifice 'to do thy will, O God,' in which the believer has part as well as his Lord; about the meaning of which there can be no more question in our day than there was in the first ages."—"Heathen and Jewish sacrifices rather show us what the sacrifice of Christ was not, than what it was. They are the dim, vague, rude, almost barbarous expression of that want in human nature which has received satisfaction in him only. Men are afraid of something; they wish to give away something; they feel themselves bound by something; the fear is done away, the gift offered, the obligation fulfilled in Christ. Such fears and desires can no more occupy their souls; they are free to lead a better life; they are at the end of the old world, and at the beginning of a new one."—The work of Christ is set forth in Scripture under many different figures, lest we should rest in one only. His death, for instance, is described as a ransom. It is not that God needs some payment before he will set the captives free. Ransom is deliverance to the captive. "Whosoever committeth sin is the servant of sin." Christ delivers from sin. "If the

son shall make you free, ye shall be free indeed." To whom? for what was the ransom paid? are questions about which Scripture is silent, to which reason refuses to answer.

A remarkably original work was issued several years ago by the Rev. John M'Leod Campbell, on the subject of the A. His views are as follows: The work of the Son of God, who came to do and did the will of his Father, must, in view of the deliverance which he wrought, be regarded as twofold: first, as dealing with man on behalf of God, and second, as dealing with God on behalf of man.

In dealing with man on behalf of God, Christ revealed to us the Father in his relation to a sinful world, showed us what our sins were to God, vindicated in the world the Father's name, and witnessed to the excellency of that will against which we were rebelling. In thus revealing the will of the Father towards sinful men, he necessarily became a man of sorrow and suffering, but these arose naturally out of what he was, and the relation in which he stood to those for whom he suffered; and to the holiness and love of his very nature must we refer their awful intensity and immeasurable amount. He suffered what he suffered just through seeing sin and sinners with God's eyes, and feeling in reference to them with God's heart. By what he suffered, he condemned sin, and revealed the wrath of God against it. His holiness and love taking the form of suffering, compose the very essence and adequacy of his sacrifice for sin.

Again, in dealing with God on behalf of man, the oneness of mind with the Father which towards man took the form of condemnation of sin, became in his dealing with the Father in relation to us a perfect confession of our sins, which was a perfect amen in humanity to the judgment of God on the sin of man. Such an amen was due in the truth of all things, due on our behalf, though we could not render it, due from him as in our nature and our true brother. He who was the truth, could not be in humanity and not utter it; and it was necessarily a first step in dealing with the Father on our behalf. This confession of our sins by him who, as the son of God and the son of man in one person, could perfectly realize the evil of man's alienation, was a peculiar development of the holy sorrow in which he bore the burden of our sins; and which, like his sufferings in confessing his Father before men, had a severity and intensity of its own. But apart from the sufferings present in that confession, this amen from the depths of the humanity of Christ to the divine condemnation of sin is necessarily conditioned by the reception of the full apprehension and realization of the wrath of God, as well as of the sin against which it comes forth into his soul and spirit, into the bosom of the divine humanity, and, so receiving it, he responds to it with a perfect response, and in that perfect response he absorbs it. For that response has all the elements of a perfect repentance in humanity, for all the sin of man—a perfect sorrow—a perfect contrition—all the elements of such a repentance, and that in absolute perfection; all—excepting the personal consciousness of sin—and by that perfect response or amen to the mind of God, in relation to sin, is the wrath of God rightly met, and that is awarded to divine justice which is its due, and could alone satisfy it.

This confession of the world's sin by the head and representative of humanity, was followed up by his intercession as a part of the full response of the mind of the Son to the mind of the Father—a part of that utterance in humanity which propitiated the divine mercy by the righteous way in which it laid hold of the hope for man which was in God. "He bore the sins of many, and made intercession for the transgressors."

The Rev. F. D. Maurice professed to hold a purely biblical theology, as opposed to the theologies of consciousness, which he repudiates. His doctrine of the A. is the answer which the Bible gives to the demands of a sin-smitten conscience. A sinner requires, and is content to be told on the authority of Scripture, that the Son of God has taken away sin. This message from God is the gospel for all men. The sinner wants to be assured that God has spoken, that he has declared himself the reconciler, and desires to be shown how and in whom he has accomplished that work on his behalf.

To this question—How and in whom the work of reconciliation has been accomplished?—Mr. Maurice replied, in effect and almost in words as follows: The will of God is set forth in the Bible to be a will which is good to all, and the ground of all that is right, true, just, and gracious; that it also sets forth the Son of God as being one in will, purpose, and substance with the Father, and that his whole life on earth was an exhibition of and submission to his Father's will; that the Son of God was Lord of men, the root and head of humanity, and the source of all light and righteousness in man: that being thus one with God and one with man, he brought the will of God into our nature, fulfilled it in our nature perfectly, and carried it down into the lowest condition into which it had fallen through sin; that in the fulfillment of this will in our nature, as its head, he shared its sufferings, enduring that wrath, or punishment, which proceeded from holy love, thus realizing, on the one hand, the sins of the world, and on the other, the consuming fury of the holiness of the love of God—with an anguish which only a perfectly pure and holy being, who is also a perfectly sympathizing and gracious being, can feel: that the man Christ Jesus was for this reason the object of his Father's continual complacency—a complacency fully drawn out by the death of the cross—which so perfectly brought out to view the uttermost power of self-sacrifice which lay hidden in the divine love, and consequently that he exhibited humanity, in its head, atoned for, reconciled. In this way, to Mr. Maurice, is Christ "the Lamb of God, which taketh away the sin of the world."—Dr. Horace Bushnell's writings also are exceedingly suggestive.

Finally, Dr. Trench, who may be regarded as fairly representing the prevalent views of the more devout and thoughtful men of the present day holding orthodox opinions, speaks as follows: "The spirit of man cries out for something deeper than repentance, confession of sin, amendment of life; something which shall reach further back; which shall not be clogged with sinful infirmities, as his own repentance even at the very best must be. Men cry for some work to rest upon, which shall not be *their* work, but which shall be God's; perfect, complete. They feel that there must be something which God has wrought, not so much *in* them as *for* them; they yearn for this, for A., propitiation, ransom, and conscience purged from dead works by the blood of sprinkling; a rock to flee to which is higher than they, than their repentance, than their faith, than their obedience, even than their new life in the spirit. Now, this rock is Christ; and John the Baptist pointed to this rock, when, to those about him who longed after more than amendment of life, he exclaimed, in the memorable words: 'Behold the Lamb of God which taketh away the sin of the world.'"

Christ's sacrifice was vicarious—he died not merely for the good of, but in the room and in the stead of others, tasted death *for* them. He did this of his own free will. He saw that nothing else would overcome their sinful perversity and willful obduracy, and that this would be effectual to do so.

Christ took upon himself the penalties of a sinful world, and his self-sacrifice is only *not* righteous, because it is so much better than righteous, because it moves in that higher region where law is no more known, but only known no more because it is transfigured into love. Vicarious suffering is the law and condition of all highest nobleness in the world. It is this which God is continually demanding of his elect, they approving themselves his elect as they freely own themselves the debtors of love to the last penny of the requirements which it makes.

But the sufferings and death of Christ were not merely vicarious, they were also satisfactory; and thus atoning or setting *at one*, bringing together the holy and the unholy, who could not have been reconciled in any other way. It is not maintained that God could have pleasure in the sufferings of the innocent and the holy, and that innocent and holy his own Son; but only that he must have the highest pleasure in the love, the patience, the obedience which those sufferings gave him the opportunity of displaying, which but for those he never could have displayed. Christ's sublime devotion to the will of God permitted the Father to say, "I have found a ransom." Christ satisfied herein, not the divine anger, but the divine craving and yearning after a perfect holiness, righteousness, and obedience in man; which craving no man had satisfied, but all had disappointed before.

The reader is referred for further and fuller information on this subject to the following works, which have been consulted and used in the preparation of this article: Baur's *Christliche Lehre von der Versöhnung*; Hase's *Hutterus Redivivus*; Neander's *Christliche Dogmengeschichte*; Gieseler's *Lehrbuch der Dogmengeschichte*; Hagenbach's *Lehrbuch der Dogmengeschichte*, vierte Auflage; Calvin's *Institutes of the Christian Religion*; Edwards, *Concerning the Necessity and Reasonableness of the Christian Doctrine of Satisfaction for Sin*; Owen's *Death of Death in the Death of Christ*, and *Of the Death of Christ*; Payne's *Lectures on Divine Sovereignty*; Chalmers's *Institutes of Theology*; Wardlaw's *Systematic Theology*; Campbell's (John M'Leod) *Nature of the Atonement*, etc.; Tayler's (J. J.) *Christian Aspects of Faith and Duty* (discourse on "Christ the Mediator"); Maurice's *Theological Essays*; Jowett's *St. Paul's Epistles*, first and second editions (article "On Atonement and Satisfaction"); Trench's *Five Sermons* (sermon on "Christ the Lamb of God"). Among works on this subject by American writers are Shedd's *History of Christian Doctrine*; Bushnell's *The Vicarious Sacrifice*, etc.

ATOOI, Atauai, the name sometimes given to Kauai (q.v.) one of the Hawaiian islands.

ATOSSA, the daughter of Cyrus and the wife successively of Cambyzes, Smerdis and Darius Hystaspis. She is mentioned by Herodotus, and according to one account was killed by Xerxes.

ATRA TO, a river of Colombia, more important from its position than from its magnitude. It has already been mentioned under the head of **AMERICA** in connection with the scheme of opening a communication between the Atlantic and the Pacific.

The main stream falls into the gulf of Darien by 9 mouths—the quantity of water, from the almost daily rains, being large in proportion to the area drained, which does not, at the utmost, exceed 300 m. by 75. Of the 9 mouths, the third in rank, the Boca Coquito, appears to offer the most available facilities for improving the navigation. About 220 m. above this entrance, opposite to Quibdo, the A. is 850 ft. wide and 8 ft. deep at the shallowest parts, while the entire fall to the sea averages less than 3 in. to a mile. Unfortunately, however, the A. itself cannot advantageously be followed thus far, because, as one advances to the s., the intervening ridge to the w. and its streams towards the Pacific become less and less practicable.

A comparatively convenient route was surveyed through the munificence of Mr. F. M. Kelley, a private citizen of New York. Ascending the Boca Coquito as before, this route leaves the main stream at a distance of 63 m. from the sea, following the Truando, one of its western affluents, for 36 m. more without impediment or interruption. From this point on the Truando to the Pacific there would still remain 32 miles

The heaviest work would be a tunnel of $3\frac{1}{4}$ m. in length. According to the plan, the canal would be without a lock. The examination made by the United States government in 1871, resulted in the opinion that the route which promised the least difficulty lay between the middle branch of the A. and the Jurador, flowing into the Pacific, which would require 48 m. of canal.

ATREBATES, or **ATREBAT'II**, a people of Belgian Gaul, whose name survives in Artois. In a confederation against Julius Cæsar they furnished 15,000 troops. There was once a colony of them in Britain, in Berks and Wilts.

A TREUS, in Greek legend, son of Pelops and Hippodamia, grandson of Thyestes and Nicippe, whose fortunes and misfortunes, with those of his family, were the favorite themes of Grecian writers and artists. A. married Cleola, by whom he was the father of Pleisthenes; his next wife was Aërope, widow of his son Pleisthenes, and by her he had Agamemnon and Menelaus; his last wife was Pelopia, daughter of his brother Thyestes. The main story of A. begins in blood, he and Thyestes being induced by their mother to kill their step-brother Chrysippus, the son of Pelops and the nymph Axioche. After the murder, the perpetrators fled to Mycenæ, where the king, Sthenelus, was their brother-in-law. The son and successor of Sthenelus lost his life in war with the Heracleids, and Atreus succeeded him as king of Mycenæ. Calamity and crime followed rapidly. Thyestes seduced A.'s wife Aërope, and stole the golden fleeced ram which was the gift of Hermes. A. expelled Thyestes, who sent A.'s own son to kill him, but the father slew the son without recognizing him. Then A. prepared a great revenge. Professing to be reconciled to Thyestes, he invited him to Mycenæ, killed Tantalus and Platenes (the two sons of Thyestes), and served them for a banquet to their father. In the midst of the meal, A. had the skeletons of the dish brought in to edify Thyestes, who, struck with horror, cursed the house of A. and fled, while the sun turned its face from the scene. The kingdom of A. was next stricken with famine, which the oracle said could be remedied only by recalling Thyestes. A. went in search of him, and, at the court of king Thesprotus, married a third wife, Pelopia, who was the daughter of his brother Thyestes, though A. supposed her to be the daughter of Thesprotus. When married, Pelopia was with child by her own father, and this child she exposed to die, but he was brought up by shepherds, and known as Ægisthus, and when A. heard of him he brought him up as his own son. Æschylus says that A. sent Agamemnon and Menelaus in search of Thyestes, whom they brought back to Mycenæ; that A. imprisoned him and sent Ægisthus to kill him; that Ægisthus, having been recognized by his real father, returned with the story that he had done the deed, and immediately slew A., who was offering sacrifice on the sea-shore.—It is believed that the tomb and the treasury of Atreus in Mycenæ have been discovered by Dr. Schliemann, the explorer of the ruined city.

A TRI (anc. *Adria* or *Hadria*), a t. of south Italy, in the province of Teramo, Abruzzi and Molise, and 14 m. s.e. from Teramo, on a steep hill, 6 m. from the Adriatic. It is of very great antiquity, and some of its coins bear a legend in Etruscan characters. Numerous remains of public buildings, baths, and walls attest its ancient importance. In a hill near the town are some remarkable subterranean chambers, supposed to be excavations of a very remote age. They are formed with the greatest regularity, but their purpose is unknown. Population about 10,000.

ATRIP. An anchor is said to be A. when it is just drawn out of the ground in a perpendicular direction. A top-sail is A. when it is just started from the cap.

ATRIPLEX. See **CHENOPODIACEÆ** and **ORACHE**.

A TRIUM, in Roman architecture, was the covered court or entrance-hall which formed the chief part of a Roman house. It was lighted from the roof, which sloped towards an opening in the center (the *compluvium*), through which the rain-water flowed into a kind of cistern situated on the floor (the *impluvium*). On both sides, passages led to the several chambers. Its size was in proportion to the other parts of the house. After the burning of Rome in the reign of Nero, great attention was paid to the decorations of the entrance-halls or *atria*. Here the female slaves were engaged in weaving and other domestic occupations, under the superintendence of their mistress. Family pictures were preserved in the A., it also contained the nuptial couch, and it served as a general waiting-room for visitors and clients. The *atria* of the temples were used as places of assembly of the senators, and for other public meetings.

AT ROPA. See **BELLADONNA**.

AT ROPHY (Gr. *atrophía*, want of nourishment; from *a*, not, and *trophé*, nourishment) is a morbid condition of animal or vegetable life, resulting in deficient nutrition of the body, or part of the body, and a consequent decay and waste of its substance. The term is not applied to the mere withholding the requisite supply of nutriment, but to the condition produced by various diseases that affect the body. See **NUTRITION**, also **DIGESTION**, **DYSPEPSIA**, **HYPERTROPHY**.

ATROP'IA, or **A TROPINE**, $C_{17}H_{23}NO_3$, is an alkaloid existing in all parts of the deadly night-shade (*atropa belladonna*). The seeds of the thorn-apple (*datura stramonium*), also

contain an alkaloid, Daturine, which for long was believed to be identical with atropia. Recent researches seem to indicate that it is, however, only isomeric, and that it is only half as poisonous as atropia. It may be prepared from the juice of belladonna by heating it to 194° F. (90° C.), filtering, and after addition of potash, shaking with chloroform. The crude alkaloid obtained after evaporation of the chloroform is purified by crystallization from hot alcohol. The crystals occur in colorless silky needles, united in tufts. It is very poisonous, $\frac{1}{100}$ of a grain causing dryness of the throat; but it is nevertheless used internally or by injection in cases of whooping-cough and pytalism. It is also used as an antidote in cases of opium poisoning. A solution of sulphate of atropia in water dropped into the eye is now generally preferred to belladonna lotions or ointments for eye diseases. It produces dilatation of the pupil and paralysis of the accommodation, which do not completely pass away for some days; and also a sedative and curative effect in many inflamed conditions. A solution of about four grains to the ounce is most often employed; but a single drop of a very much weaker solution affects the pupil.

AT'ROPOS, one of the *Moirai*, or Fates—she who severs the thread of man's life. She is represented with a cutting instrument, or a pair of scales, or a sun-dial.

ATROW'LI, or **ATRAULI**, a t. of British India, in the district of Allygurh, North-west Provinces, 63 m. n.n.e. from Agra. The streets are wide, the bazaar good, and the supply of water abundant.

A'TRYPA, a genus of fossil brachiopod or lamp-shells, having a close resemblance to the well-known *terebratula*. It possessed a perforation for the passage of the peduncle, by which the animal attached itself to foreign bodies. This foramen is not visible in all examples of the same species, from the beak touching and overlying the umbo of the other valve; the animal was, therefore, probably free during a portion of its existence. The name (derived from *a*, without, and *trypa*, foramen) was given to this genus by Dalman, as he erroneously supposed that the perforation was entirely absent. Judging from the markings on the interior of the shell, the animal seems to have differed little from the recent *rhynchonella*, except that it had large calcareous spines for the support of its labial appendages. *A.* is a strictly palæozoic brachiopod, the solitary permian species being the last representative of the genus. Of the 179 described species, 100 are silurian, 56 devonian, 22 carboniferous, and 1 permian.

ATTACHÉ (French), a subordinate or assistant. The term is generally applied to young diplomatists who accompany embassies.

ATTACHMENT is an English legal term, signifying the form of process by the authority of which the person or the goods of a debtor may be seized in satisfaction. As a proceeding against the person, it is a species of criminal process, and has the force of much that will be found under Apprehend (q.v.); but in strictness, it means a process issuing from a court of record against a person guilty of a contempt, or, more properly, of a judicial contempt, and who is punishable in a summary manner by the court in whose presence, against whose authority, or against whose writs the contempt has been overtly displayed. Thus, in Hawkins's *Pleas of the Crown*, such contempts are thus classed: 1. Disobedience to the queen's writs; 2. Contempts in the face of a court; 3. Contemptuous words or writings concerning a court; 4. Refusing to comply with the rules and awards of a court; and 5. Forgery of writs, or any other deceit tending to impose on a court. Parties are also liable to the process of *A.* as for a contempt of court where, in an arbitration (see **ARBITRATION**) the award having been made a rule of court under the 9 and 10 Will. III. c. 15, the parties refuse to obey the same. In Chancery, there may be *A.* of the person for judicial default or other offense to the court, as, for example, where a defendant fails to put in his answer or proper plea to the plaintiff's bill of complaint. The only other process of *A.* against the person which it is necessary here to notice, is the non-attendance in court of a witness, who in such event is considered to have committed a contempt of court, and to be liable to be punished for such contempt by attachment. An action may also be brought against such defaulting witness at the suit of the aggrieved party, on account of any loss or damage occasioned by the non-attendance.

The proceeding by *A.* of goods resembles in some respects the Scotch diligence or process of arrestment. See **ARRESTMENT**. The best illustration we can give of it, in this sense, is that relating to the power of a judgment creditor to recover under his judgment. By the 17 and 18 Vict. c. 125, it is provided that the judgment creditor may apply to the court or a judge for a rule or order to have the debtor orally examined as to the debts owing to him by any third party or *garnishee*, as he is called (see **GARNISHEE**), and also for an order that all such garnishee debts be attached to answer the judgment debt, the service of which order has the effect of binding or attaching the debts in the garnishee's hands.

Attachment is in our American usage applied generally to a writ for taking possession of person or property. In regard to persons *A.* is issued for contempt of court or of its proceedings and is in the nature of a criminal process. Concerning property, *A.* issues to seize effects, credits, or rights, to secure the demands of a plaintiff. In New England a summons has the force of *A.*; but in most of the states the writ

is issued only upon cause shown, and must be antedated by a bond from the defendant to make good any damages that may come from the act. In general, remedy by A. is allowed to a creditor only. Corporations and legal representatives may be reached by A. An A. does not affect the status of the property seized, and neither impairs nor enhances the owners' rights; it is only a lien on the property, and valueless if the claim be unfounded. Usually the officer making an A. is held responsible for the things seized until final adjudication. In some states the owner may keep possession of the property by giving a bond with sureties to deliver as the court may direct; in some, the A. may be dissolved on giving a bond to secure the plaintiff and what he may recover. Judgment for the defendant dissolves an A.; in some states it is dissolved by the death of the defendant, or of a corporation. Suits may be brought for malicious A., and the proceedings will be governed by the law applicable to malicious prosecution.

ATTACK, IN MUSIC, a technical term meaning the spirit and action with which a performer or singer begins a phrase.

ATTACHMENT, FOREIGN. See FOREIGN ATTACHMENT.

ATTACK. It has been frequently maintained that the balance of advantage will rest with the defense on the introduction of smokeless powders. Certainly the absence of smoke will benefit the well-covered defenders more than the exposed attacking troops. The superiority of the defense in a prepared position, with a clear field of fire, will, when the assailants enter on a frontal attack, be greater than formerly. The attack will require more time, in order that the position, no longer defined by smoke clouds, may be recognized, and the attack prepared by fire directed on it. It follows from this that the defense should never occupy sharply defined positions, such as villages and the borders of woods. The attack will have to make more use of the ground to cover its troops and to prepare their advance more thoroughly by means of artillery fire. But the defense, if it seek to decide the fight must make a counter attack, thereby changing the rôles.

From all this it appears that the relative values of the attack and the defense have not much changed. The fire action begins now at a far greater distance than formerly; fighting in extended order is the only form adopted, not only for the opening and carrying through of the fight, but also for its decision. Movements of bodies of troops in the vicinity of the enemy's fire will be more difficult; and columns cannot longer be exposed to it. The extension of front of the fighting troops, no less than the distances between the several lines and the reserves, are increased. Direct advance upon the enemy, without his fire having been previously beaten down, exposes the troops to destruction. Frontal attacks, without simultaneous pressure on the flanks, will not secure any decisive advantage, and deployments must be carried out earlier owing to the increased difficulty of reconnaissance. For a serious attack it is considered that about 10,000 men per mile are required, which is equivalent to deploying the attacking infantry into a continuous line four deep. The advanced guard of the attacking force skirmishes with the cavalry of the defense and endeavors to learn something of his force, then the artillery takes up positions toward the flanks of the line, in order to shell the position at as close a range as he can find cover from the ground, and to cover the advance of the infantry. The artillery, including the machine guns, keeps up its fire as long as it possibly can without endangering the attacking infantry, which moves rapidly forward, driving in the advanced posts of the enemy, whose main line will probably resort to volley firing as much as possible. The main objective of the attack will be what is judged to be the most decisive point. The attacking artillery will now have lessened its range to support the infantry, and will probably have to cease firing altogether during the last quarter of a mile of the advance. The guns must, however, be pushed forward as far as possible, particularly the machine guns.

In advancing, every advantage must be taken to secure cover offered by the ground passed over until near enough for the final rush, and while the chief strength is concentrated upon the objective point, the real intentions must be masked as far as possible by feigned operations. In order to make success as much felt as possible the attacking body should be supported by a reserve; a neglect of this precaution has frequently caused the entire failure of an attack. The troops told off to attack the flanks conceal their march as long as possible; on reaching the prolongation of the enemy's line they must act with rapidity and decision. The fire of the direct attack is redoubled. The advance of the troops detailed for the flank attack into the fighting line is the signal for the general assault of the position. If successful the infantry and artillery take up the works recently occupied by the enemy, and the cavalry pushes forward in pursuit on the enemy's flanks. If unsuccessful, the reserves, with the artillery and cavalry, cover the retreat. Close order, if employed, is only recommended for the reserve and for feeding the firing line; also for those moments when a powerful impulse is required to push forward the skirmish line, and when a decisive attack is to be made. The extension of the front must not be greater than is required for the greatest possible development of fire. The encounter resulting from the meeting of two opposing forces on the march, must be distinguished from the attack of a regular defensive position.

ATTAINDER is the legal consequence of judgment of death or outlawry, in respect of treason or felony. It is said to have been derived from the Latin word *attinctus*.

attaint, stained, and it is followed by *forfeiture of estate*, real and personal, and by *corruption of blood*; and generally it imported extinction of civil rights and capacities. Thus, an attainted person cannot sue in a court of justice; he loses all power over his property; and he is by his A. rendered incapable of performing any of the duties or enjoying any of the privileges of a free citizen. But absolute and severe as the consequences of A. seem to be, they had their limits. In regard to the attainted person, neither the government nor the crown could exercise absolute or capricious authority; everything must be done according to legal and constitutional principle and rule, and for the ends of public justice alone. Formerly, an attainted person could not give evidence in a court of justice; but that disability in England has been removed by the 6 and 7 Vict. c. 85, and in Scotland by the 15 and 16 Vict. c. 27.

We have stated that the immediate consequences of A. were *forfeiture of estate and corruption of blood*. The forfeiture was of estate real and personal. But in 1870 the law on this subject was revised and made more consistent with reason by the act 33 and 34 Vict. 23. No conviction for treason or felony now causes any A. or corruption of blood, or forfeiture or escheat. When a convicted person is sentenced to any punishment more severe than 12 months' hard labor, he is deprived of any public office or employment, and of any public pension, or of the right of voting at elections. He may be condemned to pay the costs or expenses incurred in procuring his conviction, and in cases of felony to make payment of a sum not exceeding £100, as compensation for any loss of property caused by such felony. He cannot sue for any property, debt, or damage. While he is a convict undergoing any imprisonment, her majesty may appoint paid administrators to take charge of his property at the convict's expense, to deal with the property, and pay debts, and do what is needful. They may also pay out of his property satisfaction for any loss or injury suffered by third parties in consequence of his criminal or fraudulent acts, though no proof of such criminal or fraudulent acts may have been made in any court of law. They may also make allowances to support the convict's family. If the crown does not appoint an administrator, justices of the peace may appoint interim curators, if satisfied that it will benefit the convict or his family, or the due administration of his property and affairs. Should any person intermeddle with the convict's property, the attorney-general or next of kin might call them to account. When the convict ceases to be such, by the expiration of his sentence, then the administrators or curators are to account to him for all his property, or rather the surplus, like and other guardians appointed by law. If during the sentence any property be acquired by the convict, it is not to vest in the administrators, but is to be his own, as in other ordinary cases.

The old consequence of A.—viz., *corruption of blood*, is anxiously and learnedly treated of in old law-books, and in Blackstone's *Commentaries*; but the ancient law on the subject had been so much narrowed in its application by modern legislation as to have lost much of its importance; and, indeed, this doctrine of corruption of blood was in modern times always looked upon as a peculiar hardship, at least as regards the family of the offender; and now, by the statutes 54 Geo. III. c. 145, already referred to, 3 and 4 Will. IV. c. 106, and 13 and 14 Vict. c. 60, whatever savored of inhumanity or harshness under the ancient system has been effectually removed; in fact, it is now enacted that, even with the cases of treason and murder, the law of corruption of blood, so far as the family of the offender are concerned, has ceased to form part of the law. Besides A., by the operation of law as above stated, there have been frequent instances of attainders by express legislative enactment, as to which see BILL OF ATTAINDER.

The Scotch law of A., consequent on a conviction for treason, corresponds to the English doctrine; and although the word A. is not a Scotch technical term in regard to crimes other than treason, the forfeitures consequent on conviction and judgment are very much the same as the English.

Attainder is wholly unknown in the United States, the 9th section of the 1st article of the federal constitution declaring: "No bill of attainder or ex-post facto law shall be passed."

ATTAINDER, BILL OF. See BILL OF ATTAINDER.

ATTAINT, WRIT OF, was anciently a mode of inquiring whether a jury had given a false verdict, which has been abolished by the 4 Geo. IV. c. 50. A. is, however, still in use to some extent as a technical word in the law of England; thus, there is the plea of *autrefois A.*, or of a former attainder, for the same crime, and now regulated by the 7 and 8 Geo. IV. c. 28, s. 4.

In the old Scotch criminal law, A., or *attaynt*, signified a conviction, or being convicted.

ATTAK'APAS, an unofficial designation for a large and fertile section in the southwestern part of Louisiana, remarkable for the production of sugar and molasses. The ATTAKAPAS INDIANS were a tribe in Louisiana called by the Choctaws "Men Eaters." The tribe became extinct many years ago.

ATTA LA, a co. in central Mississippi, on Big Black river; 750 sq.m.; pop. '90, 22,213, with colored. It produces cotton, corn, sweet potatoes, and some wheat. The Chicago, St. Louis and New Orleans railroad touches the w. border. Co. seat, Kosciusko.

ATTALEA, a genus of palms, comprising a number of species, natives of the tropical parts of South America. They have in general lofty cylindrical smooth stems, but there are some stemless species. The leaves are large and pinnate. The fruit has a dry fibrous husk, inclosing a nut with three cells and three seeds. The leaves of some species are much used for thatching, and those of some are woven into hats, mats, etc. The nuts of *A. excelsa* and of *A. speciosa* are burned to dry the India-rubber obtained from the *siphonia elastica*, which acquires its black color from their smoke. The leaf-stalks of *A. funifera*, which is found in the southern maritime provinces of Brazil, and is there called piassaba, yield a fibre much used for cordage. The ropes made of it are very strong, and extremely durable in salt water. The piassaba palm of the northern parts of Brazil, however, is totally different, and much of the piassaba (q.v.) fibre imported into Britain is obtained from it. The fruit of *A. funifera*, known by the name of coquilla nut, is as large as an ostrich's egg, and supplies a kind of vegetable ivory, used for making umbrella handles, etc. The fruit of *A. compta*, the pindóva or indajá palm, is of the size of a goose's egg, and the kernels are eatable. It is a stately and beautiful tree, with a wide-spreading crown.

ATTALUS, uncle of Cleopatra, the wife of Philip of Macedon. He was a general under Philip, and had much influence over him. At the marriage of his niece he asked the company to beg of the gods a legitimate heir to the throne, an insinuation against Alexander, who was present and who resented it. In the fight which ensued, Philip drew his sword against Alexander, who, with his mother, soon afterwards withdrew from the kingdom. Philip lost his life because of his partiality for A., for when A. had outraged Pausanias, a young man of noble family, and Pausanias had asked redress from the king without getting it, the incensed youth assassinated Philip himself. Thereafter A. played a double part with Alexander and Demosthenes, and was finally assassinated by Alexander's orders.

ATTALUS I., 269-197 B.C., King of Pergamus. He defeated the Gauls who had occupied Galatia, and was an ally of Rome in a war against Philip of Macedon.

ATTALUS II., surnamed PHILADELPHUS, 200-138 B.C.; king of Pergamus. Before coming to the throne he gained distinction as a brave and able military leader, and was on several occasions sent as ambassador to Rome. He succeeded his brother Eumenes, 159 B.C. His reign was full of wars, in which his fortune was generally good. He founded Philadelphia in Lydia, and Attila in Pamphylia, and was a generous patron of the arts.

ATTALUS III., called also PHILOMETOR, son of Eumenes II. and Stratonice; succeeded his uncle A. Philadelphus as king of Pergamus, 138 B.C. He is unfavorably known for conduct so extravagant as to seem the effect of insanity, and for the murder of friends and relatives. Being overcome with remorse, he suddenly abandoned public business, and spent his time in gardening and in sculpture. He was sunstruck while supervising the erection of a monument to his mother, and died of fever, 133 B.C. His will made the Roman people his heir.

ATTALUS, FLAVIUS PRISCUS, for one year (409-10) emperor of the west, and the first raised to that office solely through barbarian influence, being declared by Alaric and his Gothic army after the second surrender of Rome, when Honorius was deposed. The barbarians set A. up at Ravenna, whence he sent a message to Honorius commanding him to leave the throne, retire to a desert island, and cut off his feet. But Alaric soon wearied of him, and he was deposed. After Alaric's death, A. remained with Ataulphus, where he celebrated as a musician the nuptials of Placidia. Ataulphus put A. forward again as a rival emperor during the insurrection of Jovinus, but he was taken prisoner and brought to Honorius, who inflicted on him a part of the sentence he had written for the Roman emperor; he cut off his thumb and forefinger, and banished him to the island of Lipari.

ATTAMAN, or HETMAN, the title of the leading chief of the Cossacks of the Don. Formerly the A. was elected by the people, the mode being for each man to throw his fur cap at his candidate, the one having the largest heap of caps being elected. While the Cossacks were under the Poles, the A. was chosen by the Polish king. Under Russia they reserved their A. rights until the insurrection of Mazeppa, after which the office was suppressed. The last elected A. was Platoff, after whom the title became hereditary in the Russian heir-apparent.

ATTAR. See OTTO.

ATTEMPT to commit a felony or criminal offense is in many instances equally cognizable by the criminal tribunals with the completed crime itself. See TREASON, FELONY, MISDEMEANOR.

ATTENTION, the concentration of consciousness, or direction of mental energy upon a definite object. By means of it we bring within the circle of our conscious life, perceptions and ideas which could not otherwise have risen from their obscurity; or we render clearer and more distinct those already under notice. Its mode of operation, and the effect produced, may be compared with the concentration of visual activity on some definite part of the field of vision, and the clearer perception of the limited portion

thereby attained. In both cases the effect is brought about, not by any change in the perceptions themselves, but by isolating them and considering them to the exclusion of all other objects. Since all consciousness involves discrimination, that is, the isolation of one object from others, it involves A., which must therefore be defined as the necessary condition of consciousness. As the concentration of consciousness upon any one attribute of an object involves the withdrawal of consciousness from all other attributes, the withdrawal is, etymologically and logically, abstraction, which is thus the negative side of attention, the two processes forming the positive and negative poles of the same mental act.

ATTERBOM, PETER DANIEL AMADEUS, 1790-1855; a poet of Sweden. He was a leader among the students in the university of Upsal, who formed the association known as the "Aurora," designed to release Swedish literature from slavery to French models and taste. He traveled in Germany and Italy, and became German tutor to prince Oscar; he was afterwards professor at Upsal, and still later a member of the academy which he had so violently assailed. He was the founder and editor of the *Poetical Calendar*, which had much influence on the æsthetic culture of the people. Besides many poems, he was the author of a valuable review of Swedish literature.

ATTEBURY, FRANCIS, Bishop of Rochester, was b. on the 6th of Mar., 1662, at Milton, near Newport Pagnel, in Buckinghamshire, and educated at Westminster school, from which, in 1680, he passed to Christ Church, Oxford. In 1687, he gave proof of that ready controversial talent which distinguished him through life, in a reply to a pseudonymous attack on Protestantism by Obadiah Walker, master of University college. Disappointed in his expectation of succeeding to his father's rectory, in 1693, he sought a wider field of distinction, for ambition seems to have stimulated his efforts rather more than the love of souls, and in London his rhetorical powers soon won him reputation. He became a royal chaplain, minister of Bridewell, and lecturer of St. Bride's. In 1698, a temporary sensation was created in the learned world by the appearance of the Hon. Charles Boyle's *Examination of Dr. Bentley's Dissertations on the Epistles of Phalaris and the Fables of Æsop*. This clever, but shallow and malicious performance was in reality composed chiefly by A., who had been the young nobleman's tutor at Christ Church. In 1700, he distinguished himself in a controversy with Dr. Wake and others regarding the powers and privileges of convocations. A.'s zealous and caustic defense of the ecclesiastical against the civil authority, procured him the thanks of the lower house of convocation, and the degree of D.D. In 1704, he was promoted to the deanery of Carlisle, on which occasion he subjected himself to just obloquy by attempting to procure an alteration in the date of his predecessor's resignation, which happened to interpose a temporary obstacle to his appointment. In 1707, he was made a canon of Exeter; in 1709, preached at the Rolls chapel; in 1710, he was chosen prolocutor to the lower house of convocation, and in the same year he had the chief hand, according to the common belief, in drawing up the famous defense of Dr. Sacheverell; in 1712, he became dean of Christ Church, where, however, his turbulent and combative spirit had meanwhile involved him in so many controversies, that there was no peace until he was removed; in 1713, he was made bishop of Rochester and dean of Westminster. It is supposed, not unreasonably, that A. aspired to the primacy; but the death of queen Anne extinguished his hopes in that direction. His known character and Jacobite leanings made him no favorite with George I. In 1715, he refused to sign the bishops' declaration of fidelity, and some of the most violent protests of the peers against the government measures proceeded from his reckless pen. His deep complicity in a succession of plots for the restoration of the Stuarts, brought down upon him at length the charge of treason, and, in Aug., 1722, he was committed to the Tower. A bill of pains and penalties was brought into the house of commons, and passed in the lords by a majority of 83 to 43. A., who had defended himself with great ability, was deprived of all his ecclesiastical offices, incapacitated from holding any civil or spiritual office in the king's dominions, and condemned to perpetual banishment. There is no doubt of the fact that A. was implicated in treasonable plots, but the legal proof on which his sentence was founded cannot be regarded as sufficient to justify its severity. In June, 1723, he quitted England for France, and after a short stay at Brussels, finally settled at Paris, where he d., Feb. 15, 1732. In his exile, he maintained a constant correspondence with his friends, and took an active part in the abortive conspiracies of the Jacobites. His fame as a writer is founded on his sermons, and his letters to Pope, Swift, etc.; as a letter-writer, indeed, he has seldom been surpassed.

ATTESTATION, in conveyancing, is the verification of the execution of deeds and wills by witnesses; hence the clause at the end of these instruments which immediately precedes the signatures of the witnesses, is called the A. clause. See **DEED**; **WILL**; **WITNESS**. In the Scotch practice, the corresponding clause is called the testing-clause.

ATTIC, a term in architecture, employed to designate a low story rising above the cornice that terminates the main elevation of a building; in domestic architecture, it is usually applied to sky-lighted rooms in the roof.

ATTIC (pertaining to Attica), characteristic of the people of Athens, or Attica; as "A. dialect," which came to be the best form of Greek, and that in which most of the

great works of antiquity were written. There was an old and a new A. dialect; the former represented in Sophocles, Euripides, etc., and the latter in Demosthenes, and contemporary orators. Sophocles was called "the A. bee," from the sweetness of his compositions; the nightingale was the "A. bird," because Philomel was the daughter of a king of Athens; Xenophon the "A. muse," for eloquence in composition; "A. salt," indicates pungency of wit.

ATTICA, one of the political divisions or states of ancient Greece or Hellas, of which Athens was the capital. The territory is of triangular shape, having its n.e. and s.w. sides washed by the sea, while on the n. it is connected with the mainland. In ancient times, it was bounded on the w. by Megaris, and the gulf of Saronica; on the s., which ran out into the "marble steep" of Sunium, by the Ægean sea; on the e., by the Ægean sea; and on the n., by Bœotia, from which it is separated by a lofty range of hills, the most famous part of which was formerly called Cithæron. Ancient A. was thus walled in from the rest of Greece. The two principal rivers were the Cephissus and Ilissus; and if they exhibited the same features in ancient times as they do now, must have been mere mountain-torrents, dry in summer. The unfruitfulness of the soil, and the scarcity of water, compelled the inhabitants occasionally to send out colonies. According to ancient tradition, the aborigines of A. were first civilized under Cecrops, who is said to have come hither from Sais, at the mouth of the Nile in Egypt, about 1550 B.C.; and to have introduced the culture of olives, and of several species of grain, as also to have implanted milder manners, and taught the worship of the gods. He is stated to have divided the country into 12 communities or states. This, however, was not the only division known in early A. A still older division into *phylai*, or tribes, existed, as also a minute subdivision into *demoi*, or townships. By Theseus, Athens was united with the 11 other states of A. under one government, of which Athens was made the seat. After this union of the several states, the whole of A. shared in the fortunes of Athens (q. v.), and, under Vespasian, became a Roman province. On the division of the Roman empire, A. naturally fell into the hands of the Greek emperors. In 396 A.D., it was captured by Alaric, king of the Goths. What may have been its population in ancient times, it is impossible to determine precisely. Clinton estimates it at upwards of half a million, but this is probably exaggerated.

In the present arrangement, Attica and Bœotia form a department or government in the kingdom of Greece. The surface of the country is broken into hills and narrow plains. The most considerable hills are—Oxea, 4636 ft.; Elaté, 4629; Pentelicus, famous for its marble in ancient times, of a white brilliant appearance and perdurable character, 3884; and Hymettus, 3506. The largest plains extend in the neighborhoods of Athens and Eleusis. As early as the time of Solon, A. was well cultivated, and produced wine and corn. Mt. Hymettus was celebrated for its bees and honey, and metals were found in the range of Laurium. Figs, olives, and grapes are still cultivated.

ATTIC SALT, a poignant, delicate wit peculiar to the Athenians. See **ATTIC**. In like phrase, the old Roman wit is called *Italian vinegar*.

ATTICUS, TITUS POMPONIUS, one of the most noble and generous men in ancient Rome, was b. in 109 B.C., or a few years before the birth of Cicero. His excellent education, during which he enjoyed the companionship of Torquatus, the younger Marius, and Cicero, developed, at an early age, a love of knowledge, which was increased during his stay in Athens, where he remained many years, glad to be separated from the political distractions of his native land. After 65 B.C., when he was induced by Sulla to return to Rome, he still devoted himself chiefly to study and the pleasures of friendship, and refused to take any part in political affairs. Yet he was by no means without influence on public matters, as he lived on terms of familiar intercourse with several leading statesmen, and freely gave his counsel, which was generally sound and wholesome, while it was always benevolent. He was a man of great wealth, having been left a large inheritance by his father and his uncle, which he greatly increased by judicious mercantile speculations. His mode of life was frugal. When he was informed that a disorder under which he was laboring was mortal, he voluntarily starved himself, and d. in 32 B.C. Among his personal friends, Cicero held the first place. The *Annales*, written by A., were highly commended by his contemporaries. They were especially valuable on account of containing genealogical histories of the old Roman families. A. was one of those men (not uncommon either in ancient or modern times) in whom fine culture and a fortunate social position had highly developed the faculty of good taste. He had no creative genius, but was possessed of such delicate discernment that he could detect the flaw that would have been invisible to Cicero. Every author was anxious to secure his favorable opinion. None of his writings have been preserved. His biography is found in Cornelius Nepos, and in Cicero's *Epistles to A.*

ATTICUS HERODES, TIBERIUS CLAUDIUS, b. about 104 A.D., a rich Athenian. To a vast sum of money left him by his father, he added much more by marriage. He was educated by the best masters, devoting special attention to oratory, in which he greatly excelled. He was also a noted teacher of rhetoric, having for pupils Marcus Aurelius and Lucius Verus. From Aurelius he received the archonship of Athens and the consulate of Rome. His fame rests mainly upon immense expenditures for public purposes. In Athens he built a race-course of Pentelic marble, and a splendid theater. In Corinth

he built a theater; in Delphi, a stadium; at Thermopylæ, hot-baths; at Canusium, in Italy, an aqueduct. He contemplated a canal across the isthmus of Corinth, but gave it up because Nero had tried and failed. He restored several of the partially ruined cities of Greece, where inscriptions testified the public gratitude to him. For some reasons the Athenians became his enemies, and he left the city for his villa near Marathon, where he d. 180 A.D. Nothing of his writing is known to exist.

ATTILA (Ger. *Etzel*; Hungarian, *Ethel*, conjectured to have been originally titles of honor), King of the Huns, was the son of Mundzuk, a Hun of the royal blood, and in 434 A.D. succeeded his uncle Roas as chief of countless hordes scattered over the n. of Asia and Europe. His brother Bleda, or Blödel, who shared with him the supreme authority over all the Huns, was put to death by A. in 444 or 445 A.D. The Huns regarded A. with superstitious reverence, and Christendom with superstitious dread, as the "scourge of God." It was believed that he was armed with a supernatural sword, which belonged to the Scythian god of war, which must win dominion over the whole world. It is not known when the name "scourge of God" was first applied to A. He is said to have received it from a hermit in Gaul. The whole race of Huns was regarded in the same light. In an inscription at Aquileia, written a short time before the siege in 452, they are described as *imminentia peccatorum flagella* (the threatening scourges of sinners). The Vandals, Ostrogoths, Gepidæ, and many of the Franks, fought under his banner, and in a short time his dominion extended over the people of Germany and Scythia—i.e., from the frontiers of Gaul to those of China. In 447, after his unsuccessful campaign in Persia and Armenia, he advanced through Illyria, and devastated all the countries between the Black sea and the Mediterranean. Those inhabitants who were not destroyed were compelled to follow in his train. The emperor Theodosius collected an army to oppose the inundation of the barbarians, but in three bloody engagements fortune declared against him. Constantinople owed its safety solely to its fortifications and the ignorance of the enemy in the art of besieging; but Thrace, Macedon, and Greece were overrun; seventy flourishing cities were desolated, and Theodosius was compelled to cede a portion of territory s. of the Danube, and to pay tribute to the conqueror, after treacherously attempting to murder him. In 451, A. turned his course to the w., to invade Gaul, but was here boldly confronted by Aëtius, leader of the Romans, and Theodoric, king of the Visigoths, who compelled him to raise the siege of Orleans. He then retired to Champagne, and in the wide plain of the Marne—called anciently the Catalaunian plain—waited to meet the enemy. The army of the west, under Aëtius and Theodoric, encountered the forces of the Huns near the site now occupied by the city of Chalons-sur-Marne. Both armies strove to obtain the hill of moderate height which rises near Mury, and commands the field of battle, and after a terrible contest, the ranks of the Romans and their allies, the Visigoths, were broken. A. now regarded victory as certain, when the Gothic prince, Thorismond, immediately after his father had fallen, assumed the command, and led on the brave Goths, who were burning to avenge the death of Theodoric. Their charge from the height into the plain was irresistible. On every side the Huns were routed, and A. with difficulty escaped into his encampment. This, if old historians are to be trusted, must have been the most sanguinary battle ever fought in Europe; for it is stated by contemporaries of A., that not less than 252,000 or 300,000 slain were left on the field. A., having retired within his camp of wagons, collected all the wooden shields, saddles, and other baggage into a vast funeral pile, resolving to die in the flames rather than surrender; but by the advice of Aëtius, the Roman general, the Huns were allowed to retreat without much further loss, though they were pursued by the Franks as far as the Rhine. In the following year, A. had recovered his strength, and made another incursion into Italy, devastating Aquileia, Milan, Padua, and other cities, and driving the terrified inhabitants into the Alps, Apennines, and the lagoons of the Adriatic sea, where they founded Venice. The Roman emperor was helpless, and Rome itself was saved from destruction only by the personal mediation of pope Leo I., who visited the dreaded barbarian, and is said to have subdued his ferocity into awe by the apostolic majesty of his mien. This deliverance was regarded as a miracle by the affrighted Romans, and old chroniclers relate that the apostles Peter and Paul visited the camp of A., and changed his purpose. By 453, however, A. appears to have forgotten the visit of the two beatified apostles, for he made preparations for another invasion of Italy, but died of hemorrhage on the night of his marriage with the beautiful Ildiko. His death spread consternation through the host of the Huns. His followers cut themselves with knives, shaved their heads, and prepared to celebrate the funeral rites of their king. It is said that his body was placed in three coffins—the first, of gold; the second, of silver; and the third, of iron; that the caparison of his horses, with his arms and ornaments, were buried with him; and that all the captives who were employed to make his grave were put to death, so that none might betray the resting-place of the king of the Huns.

Jornandes describes A. as having the Mongolian characteristics—low stature, a large head, with small, brilliant deep-seated eyes, and broad shoulders. There can be little doubt that circumstances conspired, in the case of A., to give a certain largeness to his barbaric conceptions, which made him a most formidable foe to the civilization of Europe.

ATTIUS, OR ACCIUS, LUCIUS, a Roman tragic poet, born 170 B.C., died about the year 90 B.C. He exhibited his first play at the age of 30, continuing from that time till his death his literary labors. He is, perhaps, the greatest of the Roman tragic writers. He wrote about 40 tragedies, of which only about 750 lines are extant. He wrote also *Annales*, mythological histories in hexameter verse, *Didascalica*, a history of Greek and Roman poetry, and a work called *Pragmatica*, treating of literary history. He wrote also on agriculture.

ATTLEBORO, a town in Bristol co., Mass., 31 miles southwest of Boston, on Mill river, and the junction of branches of the Old Colony railroad, formed originally a part of Rehoboth, and was incorporated in 1694. It comprises nine villages, has public schools, banking facilities, churches, manufactures of jewelry, clocks, watches, buttons, silverware, cotton, woolen and worsted goods, leather belting, coffin hardware, and shuttles. Pop. '90, 7577.

AT TOCK, a t. and fort of the Punjab, on the left or e. bank of the Indus, lat. 33° 54' n.; long. 72° 20' e. Pop. 2000. A. stands within the limits of the fort, which is itself a parallelogram of 800 yards by 400. The place was established by the emperor Akbar in 1581, to defend the passage of the river. In modern warfare, however, it is no longer a position of strength, being commanded by the neighboring heights. The Indus is crossed at A. by a railway bridge.

ATTORNEY, in its general meaning, is one appointed by another to act for him in his absence, the authority for so acting being expressed by a deed called a power of attorney.

ATTORNEY, one put in another's place to manage his affairs. An *A. in fact* is one formally appointed, and any person of sufficient age and understanding can be chosen. An *A. at law* is an officer of the court employed by a client to manage his cause; his business being to carry on the formal and practical work of the suit, to be true to the court, and faithful to his client; if called as a witness he may refuse to disclose matters in confidence between himself and his client. An *A.* may be disbarred for certain offenses.

ATTORNEY-GENERAL, the title by which, in England and Ireland, the first ministerial law officer of the crown is known. The *A.* is appointed by letters-patent. His office, powers, and duties correspond in many respects to those of the lord advocate in Scotland (see **ADVOCATE, LORD**), though the powers of the latter are more extensive and less clearly defined. Originally, the *A.* was simply the king's attorney, and stood to the sovereign in the same relation that any other attorney does to his employer. The term "general" was afterwards conferred to distinguish him from attorneys appointed to represent the interests of the crown in particular courts, such as the court of wards; or from the master of the crown office, who is called the "coroner and attorney for the queen." The early history of this office is involved in obscurity. Though there can be no doubt that the crown must always have been represented by an attorney in the courts of justice, there is no trace of the existence of such an officer as the *A.*, in the modern sense, till some centuries after the conquest. Up to a period comparatively recent, the king's serjeant was the chief executive officer of the crown in criminal proceedings, and this circumstance gave rise to various questions of difficulty as to the right to precedence of these officers respectively. These questions were set at rest in 1811, by a special warrant by the then prince Regent, afterwards king George IV., by which it was declared that both the attorney and solicitor general should have place and audience before all other members of the English bar. A similar question arose in a Scotch appeal in the house of lords in 1835, between the *A.* and lord advocate, which was also decided in favor of the former. The following may be enumerated as the principal duties of the *A.*: 1st, To exhibit informations and conduct prosecutions for crimes which have a tendency to disturb the peace of the state or endanger the constitution (see *Plea of the Crown* under **PLEA**); 2d, To advise the government on legal questions; 3d, To conduct prosecutions and suits relating to the revenue; 4th, To file informations in the exchequer for personal wrongs committed on any of the possessions of the crown; 5th, To protect charitable endowments in the sovereign's name, as *parens patrie*, and, generally, to appear in all legal proceedings in which the interests of the crown are at stake. The attorney and solicitor general are two of the commissioners of patents (*q. v.*) *ex officio*. The powers of the solicitor general are co-ordinate with those of the *A.*, and in the absence of the latter, or during a vacancy, the former may perform his functions in all their extent. Both usually have seats in the house of commons, and their tenure of office concurs with that of the government of which they are members. They were formerly paid by fees, but now by fixed salary.

ATTORNEY-GENERAL, in the United States, an officer of the cabinet, charged with the conduct of the legal business of the government. There is an *A.-G.*, or some officer having similar powers and duties, in each state.

ATTORNEY, POWER OF, an instrument authorizing a person to act as the agent or attorney of the person granting it. A general power authorizes the agent to act generally for the principal. A special power limits the agency to particular things. A power of attorney may be by parole, or under seal. The attorney cannot execute a

sealed instrument that will bind his principal unless his own power is given under seal. Grants of this nature are very strictly construed. Authority given to one person cannot be delegated by him to another, unless expressly set forth in the original grant. The death of the principal at once cancels a power of attorney. All conditions in the power must be strictly observed to render the attorney's action legal.

ATTORNEYS AND SOLICITORS are those practitioners in England who conduct suits in courts of justice, preparing the cause for the barristers, or counsel, as they are called, whose duty and privilege it is to plead and argue on behalf of the contending parties, and who in open court have its exclusive audience. A. and S. also practice conveying, or the preparation of legal deeds and instruments, and they manage a great deal of other general business connected with the practice of the law, for which, as well as for the discharge of all their duties, they are mostly remunerated by a fixed and minute scale of charges. Theirs is, indeed, an extremely important, influential, and lucrative profession, and the well-employed attorney, and the "family solicitor," are expressions which readily suggest the idea of acute intelligence, along with high character and confidential trusts seldom abused.

They are called *A.*, as practitioners in the courts of common law, because the attorney is one who is put in the place, stead, or *turn* of another. Formerly, when prosecuting or defending, suitors were obliged to appear *personally* in court; but now, on principles of convenience, *A.* may represent, and can often prosecute or defend any action or suit in the absence of the parties. They are called *S.* in the courts of *chancery*, according theoretically to the more gentle (but not less absolute) compulsion of equity. *S.* also is the name usually given to this profession when they transact family or other general business out of court, and in their own chambers. *A.* and *S.* are admitted by the superior courts, of which, therefore, they are officers, having many privileges as such, and they are, in consequence, peculiarly subject to the censure and control of the judges.

The statutes relating to this branch of the legal profession being numerous and complicated, were amended and consolidated by the 6 and 7 Vict. c. 73, etc., and 33 and 34 Vict. c. 28. No person shall act as an attorney or solicitor in any court of civil or criminal jurisdiction, or in any court of law or equity in England or Wales, unless he shall have been admitted, enrolled, and be otherwise duly qualified according to the provisions of the act. And it has been decided that the person who acts as an attorney without being properly qualified, is liable to be indicted for a misdemeanor. There is an exception, however, to the rule of admission as stated, contained in a subsequent act, the 7 and 8 Vict. c. 101, s. 68, which provides that clerks or other officers to any board of guardians under the poor laws, may commence or defend proceedings before magistrates, in special or petty sessions, or out of sessions, without being qualified as attorneys. And by the 20 and 21 Vict. c. 39, facilities are afforded for the admission and enrollment in England of *A.* and *S.* of those colonial courts where the English system prevails.

To entitle a person to admission as an attorney and solicitor under 23 and 24 Vict. c. 127, and 6 and 7 Vict. c. 73, it is required, first, that he shall have served—having been duly bound by contract in writing so to do—with some practising attorney or solicitor in England or Wales, a clerkship of five years; or—if a barrister, advocate, W.S., or S.S.C., or graduate of Scotch or Irish university, or of Cambridge, Oxford, Dublin, Durham, or London—a clerkship of three years. In some cases, four years' service are allowed. He must now pass a preliminary examination in general knowledge, as well as occasional examinations in legal subjects during his articles. The judges now have large controlling and dispensing powers as to the articles, service, fitness, and capacity to act; and the judges (or master of the rolls, as the case may be), upon being satisfied by such examination, or by the certificates of examiners appointed by them, of the competency of any candidate for admission, shall administer to him such oath as specified in the act, viz., "that he will truly and honestly demean himself in practice," and also the oath of allegiance; and after such oaths, shall cause him to be admitted as an attorney of the said courts of law at Westminster, or as solicitor of the high court of chancery. It is moreover enacted, that there shall be a registrar of *A.* and *S.*, whose duty it shall be to keep an alphabetical list or roll of all *A.* and *S.*, and to issue certificates as to persons who have been duly admitted and enrolled; and the duties of this office are by the act committed to the "incorporated law society," until some person shall be appointed in their room. Such a certificate from the registrar, of due admission and enrollment, must be produced to the proper authorities, by any person desirous of practicing as an attorney or solicitor, before he can obtain the stamped certificate required by the stamp act, 33 and 34 Vict. c. 97, authorizing him to practice for the ensuing year; and in order to obtain such registrar's certificate, a declaration in writing, signed by the attorney desirous of practicing, or by his partner, or in some cases by his London agent, containing his name and address, the courts of which he is an admitted attorney or solicitor, and the date of his admission, must be delivered to the registrar. And if any attorney or solicitor shall practice in any of the courts aforesaid, without having obtained a stamped certificate for the current year, he shall be incapable of maintaining any action or suit to recover his fees, and be guilty of a contempt of court, and subject to fine.

The same statute also contains the following regulations, among others of less general information: That no attorney or solicitor shall have more than two clerks, bound by contract in writing, at one and the same time; nor any such clerk after he shall have left off business. That all persons admitted as A. of one of the superior courts of law at Westminster may, upon production of a certificate thereof, be admitted in any other court of law in England or Wales, upon signing the roll of the same; and that persons admitted as S. in the high court of chancery may in like manner obtain their admission in all other courts of equity, and in the court of bankruptcy. That no attorney or solicitor, who shall be a prisoner in any jail or prison, may commence or defend any action, suit, or proceeding in law, equity, or bankruptcy; or maintain any action for fees for business done during such his confinement; and that no practicing attorney or solicitor shall be a justice of the peace in England or Wales, except in counties or towns corporate having justices by charter or otherwise. And that no attorney or solicitor shall commence an action or suit for his fees or charges in respect of any business whatever, until after the expiration of one calendar month after a bill of his costs and charges, signed by such attorney or solicitor, shall have been delivered to the party to be charged; and such party may, on a proper application, obtain an order for referring such bill to be taxed; and for staying all proceedings to recover the amount thereof in the mean time. An order may also be obtained directing an attorney or solicitor to deliver his bill (when he has not done so); and also an order for his delivering up, upon payment of what is due, all deeds, papers, and documents in his possession or power touching the business in such bill comprised. Attorneys may now, under the act 33 and 34 Vict. c. 28, enter into special agreements with their clients as to their remuneration. But this agreement, as regards suits and actions, must be deemed by the taxing officer or a court to be reasonable and fair. They may now also make it one of the stipulations that they shall not be liable for negligence. But they are still prohibited from stipulating for payment only in the event of success.

The position of A. and S. in Ireland, like the system of law and practice in that country generally, is so like that of the same profession in England, that it is unnecessary here to give any details respecting them.

The corresponding professional class in Scotland was, up to the year 1874, composed of several distinct bodies called writers to the signet, and solicitors before the supreme courts, who had the exclusive right to practice before the court of session; and of procurators, whose practice was confined to their own sheriff courts. The unsatisfactory relations existing between these bodies led to a revision of the law, which was embodied in the law agents' act of 1873 (36 and 37 Vict. c. 63). No person was thereafter entitled to be admitted a law agent in Scotland except under the new regulations, and all enrolled law agents were to have the right, on payment of proper stamp-duties, to practice in any court of law in Scotland. Applicants for future admission are to be apprenticed for five years with a practicing law agent; but advocates, English barristers, and attorneys are to serve only three years, as also graduates of a university.

In the United States the functions of attorney, solicitor, and barrister (or counsellor) are all discharged by the same person, who is fully entitled "attorney and counsellor-at-law." He is regarded as an officer of the court, and is liable to have his name stricken off the roll in case of aggravated breaches of legal decorum and other weighty causes. See **LAWYER**.

ATTRACTION is the general name for the force or forces by which all bodies, from the minutest particles to the largest planets, suns, and systems of suns, tend to approach, or are drawn towards (*ad*, to; *tractus*, drawn) one another, and when in contact, are held together. The term is generic, embracing a vast variety of facts, which are subdivided under 5 heads or species of A. These are: 1. gravitation; 2. cohesion; 3. adhesion; 4. chemical affinity; 5. the attractions of electricity, magnetism, etc. See **GRAVITATION**, **COHESION**, etc. Attempts have been made to deduce all these phenomena from one principle of A., modified by an opposing force of repulsion, but as yet without success. Still less can they be explained by assuming only *one* force—A. alone, or repulsion alone—for this, too, has been attempted. The idea of an attractive force acting as the bond of the universe was first introduced as a scientific hypothesis by Newton, and was violently combated by Leibnitz and others.

ATTRIBUTE, in the fine arts, is a species of symbol, consisting of a secondary figure, or object accompanying the principal figure—as the trident of Neptune, or the owl of Minerva. Attributes serve to mark the character meant, and add to the significance of the representation. The necessity of using them lies in the limited means of expression possessed by the formative arts. Attributes may be either essential or conventional. Essential attributes have some real relation or resemblance to the object or idea to be expressed; and are often such as could stand alone as symbols—as the bee, representing diligence. Attributes, in the strictest sense, and as distinguished from symbols, are such as are significant only in connection with a figure, to which they in a manner belong; e.g., the wings of genii, the finger on the mouth of Harpocrates. The last is an example of an accidental or conventional A., of which kind are also the *anchor*, to express hope; the *cross*, faith. Common attributes in Christian art are—the harp for king David, and writing materials for the evangelists, especially St. John.

ATTRIBUTE, in logic, is used to denote the opposite of substance. The latter is considered to be self-existent, while the former can only be conceived as possessing a dependent existence. Attributes are commonly said to belong to substances. Thus, wisdom, holiness, goodness, and truth are termed attributes of God, who is Himself regarded as the substance in which they inhere; in the same way, whiteness is called an A. of snow.

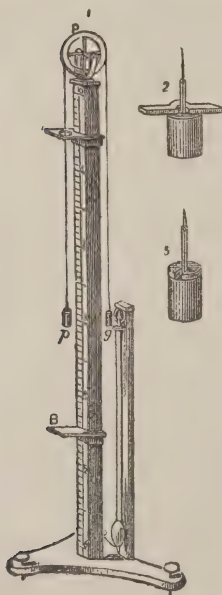
ATTU, or **ATTOO**, the westernmost of the Alaskan group of Aleutian islands, and the extreme w. point of U. S. territory, being further west of San Francisco than San Francisco is of the boundary of Maine. Lat. $52^{\circ} 58'$ n.; long. $187^{\circ} 34'$ w. It has a village with about 60 native families.

ATTUCKS, CRISPUS, an Indian mulatto, of Framingham, Mass., killed Mar. 5, 1770, in the "Boston massacre." There had been several collisions between the people and the soldiers, in one of which A. headed a party in King street, now State street. He seized the bayonet of a soldier and knocked him down; a volley was fired, and A. was the first to fall. There was a great funeral in Faneuil Hall, and the incident was for some time annually commemorated, serving well the purposes of the approaching revolution.

ATWATER, LYMAN HOTCHKISS, D.D., b. Conn., 1813; a graduate of Yale, and tutor and theological student there. Dr. A. was pastor of a Congregational church in Fairfield, Conn., and professor of mental and moral philosophy, and of logic and moral and political science in the college of New Jersey. In 1869, he became editor of the *Princeton Review*. He was the author of a *Manual of Logic*, and a frequent writer for periodicals. He held high rank as a christian thinker and teacher: He d. 1883.

ATWOOD'S MACHINE, an instrument for illustrating the relations of time, space, and velocity in the motion of a body falling under the action of gravity. It was invented by George Atwood or Attwood, a mathematician of some eminence, who was b. in 1745, educated at Cambridge, became fellow and tutor of Trinity college in that university, published a few treatises on mechanics and engineering, and died in 1807. It is found that a body falling freely, passes through 16 ft. in the first second, 64 ft. in the first two seconds, 144 ft. in the first three seconds, and so on. Now, as these spaces are so large, we should require a machine of impracticable size to illustrate the relations just mentioned. The object of A. M. is to reduce the scale on which gravity acts without in any way altering its essential features as an accelerating force. The machine consists essentially of a pulley, P (see fig. 1), moving on its axis with very little friction, with a fine silk cord passing over it, sustaining two equal cylindrical weights, *p* and *g*, at its extremities. The pulley rests on a square wooden pillar, graduated on one side in feet and inches, which can be placed in a vertical position by the leveling-screws of the sole on which it stands. Two stages, A. and B, slide along the pillar, and can be fixed at any part of it by means of fixing-screws. One of these stages, A, has a circular hole cut into it, so as to allow the cylinder, *p*, to pass freely through it; the other is unbroken, and intercepts the passage of the weight. A series of smaller weights, partly bar-shaped,

partly circular, may be placed on the cylinders in the way represented in figs. 2 and 3. A pendulum usually accompanies the machine, to beat seconds of time. The weight of the cylinders, *p* and *g*, being equal, they have no tendency to rise or fall, but are reduced, as it were, to masses without weight. When a bar is placed on *p*, the motion that ensues is due only to the action of gravity upon it, so that the motion of the whole must be considerably slower than that of the bar falling freely. Suppose, for instance, that *p* and *g* are each $7\frac{1}{2}$ ozs. in weight, and that the bar is 1 oz., the force acting on the system—leaving the friction and inertia of the pulley out of account—would be $\frac{1}{16}$ of gravity, or the whole would move only 1 foot in the first second, instead of 16. If the bar be left free to fall, its weight or moving force would bring its own mass through 16 ft. the first second; but when placed on *p*, this force is exerted not only on the mass of the bar, but on that of *p* and *g*, which is 15 times greater, so that it has altogether 16 times more matter in the second case to move than in the first, and must, in consequence, move it 16 times more slowly. By a proper adjustment of weights, the rate of motion may be made as small as we please, or we can reduce the accelerating force to any fraction of gravity. Suppose the weights to be so adjusted that under the moving force of the bar or circular weight the whole moves through 1 in. in the first second, we may institute the following simple experiments: *Experiment 1*.—Place the bar on *p*, and put the two in such a position that the lower surface of the bar shall be horizontally in the same plane as the 0 point of the scale, and fix the stage A at 1 inch. When allowed to descend, the bar will accompany the weight, *p*, during one second and for 1 in., when it will be arrested by the stage A, after which *p* and *g* will continue to move from the momentum they have acquired in passing through the first inch. Their



Atwood's machine.

velocity will now be found to be quite uniform, being 2 in. per second, illustrating the principle that a falling body acquires, at the end of the first second, a velocity per second equal to twice the space it has fallen through. *Exp. 2.*—Take, instead of the bar, the circular weight, place the bottom of *p* in a line with the 0 point, and put the stage B at 64 in. Since the weight accompanies *p* throughout its fall, we have in this experiment the same conditions as in the ordinary fall of a body. When let off, the bottom of the cylinder, *p*, reaches 1 in. in 1 second, 4 in. in 2 seconds, 9 in. in 3 seconds, 16 in. in 4 seconds, 25 in. in 5 seconds, 49 in. in 7 seconds, and 64 in. and the stage in 8 seconds—showing that the spaces described are as the squares of the times. *Exp. 3.*—If the bar be placed as in *exp. 1*, and the stage A be fixed at 4 in., the bar will accompany the weight, *p*, during 2 seconds, and the velocity acquired in that time by *p* and *g* will be 4 in. per second, or twice what it was before. In the same manner, if the stage A be placed at 9, 16, 25, etc. in., the velocities acquired in falling through these spaces would be respectively 6, 8, 10, etc. in.—2 in. of velocity being acquired in each second of the fall. From this it is manifest that the force under which bodies fall is a uniformly accelerating force—that is, adds equal increments of velocity in equal times. By means of the bar and the stage A, we are thus enabled to remove the accelerating force from the falling body at any point of its fall, and then question it, as it were, as to the velocity it has acquired.

ATTYS, **ATTIS**, or **ATTES**, a beautiful shepherd of Phrygia, son of Nana. Cybele loved him, and made him her priest, on condition that he should preserve entire chastity; but he transgressed with the daughter of a river god, for which offense Cybele made him insane, in which condition he deprived himself of further temptation to unchastity. He was about to kill himself when Cybele changed him into a fir-tree, which she made sacred to herself, and decreed that all her priests thereafter should be eunuchs. Like many other myths, this one is supposed to represent the successive death and regeneration of nature by the changes of the seasons. In art, A. is represented as a shepherd with crook and flute. He was worshiped with the goddess in Cybele's temples.

AUBAGNE (anc. *Albania*), a t. of the dep. of Bouches-du-Rhône, France, stands on the Huveaune, 9 m. e. from Marseilles, with which it is connected by railway. It is built with some regularity and elegance. The ancient town stood on a hill, at the base of which the present town is situated. It was the capital of the Albicii.

AUBE, the name of a river and a department of France. The river A. is a tributary of the Seine, rises near Pralay, on the plateau of Langres; flows in a n.w. course by Rouvres, La Ferté, Bar, and Arcis; and falls into the Seine at Pont-sur-Seine, after a course of 90 miles.—The department of A., which occupies the southern part of the old province of Champagne, and a small portion of Burgundy, is bounded on the n. by the Marne, on the e. by the Haute-Marne, on the s.w. by the Yonne, and on the n.w. by the Seine-et-Marne. The eastern part belongs to the basin of the A.; the western, to the basin of the Seine. Area, 2317 sq.m. Pop. '96, 251,435. The climate is mild, moist, and changeable; but on the whole healthy. A great portion of the area is arable land. The n.e. is chiefly applied to pasturage; but the s.e. is far more fertile, rich in meadowland and forest, and producing grain, hemp, rape, hay, timber, and wine. In minerals, the department possesses little besides limestone, marl, and potters' clay. The chief manufactures are woolen cloth, cotton and linen goods, ribbons and stockings, leather, parchment, etc. The sausages and bacon of A. have long been famous. *Troyes* is the capital of the department.

AUBENAS, a t. in France, in the department of Ardèche. It is picturesquely situated on the right bank of the Ardèche, 14 m. s.w. from Privas, in the middle of the volcanic region of Vivarais. It looks well from a distance; but the streets, with the exception of one traversed by the diligence, are narrow and crooked, the squares small, and the houses very irregularly built. An old and rapidly decaying wall, flanked with towers, girds the town, which contains an ancient castle. A. is the principal mart for the sale of chestnuts and silk in the department. Several important fairs are also held here. It possesses in addition manufactures of silk, paper, cotton, coarse cloths, leather, etc., the machinery of the mills being driven by water. Pop. of commune '91, 7824.

AUBER, **DANIEL FRANÇOIS ESPRIT**, a composer of operas, was b. at Caen in Normandy, Jan. 29, 1782. His father was a printer in Paris, and being desirous that his son should devote himself to business, he sent him to London to acquire a knowledge of the trade. But his irresistible passion for music obtained the upper hand, and after a short stay he returned to Paris. Among his earliest compositions may be noticed the *concertos* for the violoncello, ascribed to Lamare the violoncellist; the concerto for the violin, played by Mazas with great applause at the conservatory of music, Paris; and the comic opera, *Julie*, with a modest accompaniment for two violins, two altos, and a bass. These works were very successful; but A., aspiring to greater things, now devoted himself to a deeper study of music under Cherubini, and wrote a mass for four voices. His next work, the opera *Le Séjour Militaire* (1813), was so coldly received that A. grew disheartened, and resolved to abandon the idea of reaching eminence as a musical composer. However, the death of his father compelled him to be dependent on his own resources; and in 1819

appeared *Le Testament et les Billets-doux*, which was also unsuccessful; but in *La Bergère Châtelaine* he laid the foundation of his subsequent fame. In all these early essays, as well as in the opera of *Emma* (1821), he displayed an original style; but afterwards he became an imitator of Rossini, and disfigured his melodies with false decorations and strivings for effect. All his later works, excepting *La Muette de Portici* (Masaniello), produced in 1828, are written with an assumed mannerism, but in a light and flowing style, with many piquant melodies which have made the tour of Europe. The operas *Leicester* (1822), *La Neige* (1823), *Le Concert à la Cour*, and *Léocadie* (1824), *Le Muçon* (1825), *Fiorella* (1826), *La Fiancée* (1829), *Fra Diavolo* (1830), were followed by a series of lighter works: *L'Élixir d'Amour*, *Le Dieu et la Bajadère*, *Les Faux Monnayeurs*, etc.; the later operas, *Gustave ou le Bal Masqué*, *Le Lac des Fées*, *Le Cheval de Bronze*, *Les Diamants de la Couronne*, *La Part du Diable*, *La Sirène*, and *Haydée*, exhibiting the same popular qualities as their predecessors; but their interest is evanescent, as they are deficient in depth of thought and feeling. His later works are *Jenny Bell* (1855) and *Manon Lescaut* (1856). In 1842, A. was appointed director of the conservatory of music, Paris. He d. May 14, 1871.

AUBERT DU BAYET, JEAN BAPTISTE ANNIBAL, 1759-97; a French general who served with Rochambeau in the American revolution. He was in the French assembly in 1791; commanded at the siege of Metz in 1793; was minister of war in 1795, and minister to Constantinople, where he d. in 1797.

AUBERT, JEAN ERNEST, b. France, 1824; artist. He took the Prix de Rome, 1844, for engraving, and devoted himself to that art and to lithography until abt. 1877, when he became known as a painter. Among his works are, "The Broken Thread," "At the Fountain," and "The Lesson in Astronomy."

AUBERVILLIERS, a village of France, near Paris; pop. 19,437. There was once a picture of the Virgin in the village church which was thought to possess miraculous powers, and the church was known as Notre Dame des Virtus.

AUBIGNÉ, MERLE D'. See MERLE D'AUBIGNÉ.

AUBIGNÉ, THEODORE AGRIPPA D', a famous French scholar, was b. on 8th Feb., 1550, near Pons in Saintonge. At an early period, he exhibited a remarkable talent for the acquisition of languages. Although come of a noble family, he inherited no wealth from his father, and consequently chose the military profession. In 1567, he distinguished himself by his services to the Protestant cause, and was subsequently rewarded by Henry IV., who made him vice-admiral of Guienne and Bretagne. His severe and inflexible character frequently embroiled him with the court; and after the death of Henry, he betook himself to Geneva, where he spent the remainder of his life in literary studies. He d. Apr. 29, 1630.

His best known work is his *Histoire Universelle*, 1550-1601 (Amsterdam, 1616-1620), was burned in France by the common hangman, as also his *Histoire Secrète, écrite par lui-même* (1721). A. was possessed of a spirit of biting satire, as is proved by his *Confession Catholique du Sieur de Sancy*, and his *Aventures du Baron de Feneeste*.

AUBREY, JOHN, 1625-97; an English antiquary. He was a diligent collector of old documents, and left some valuable works of his own. He wrote *Natural History and Antiquities of Sussex* and *Letters written by Eminent Persons of the Seventeenth and Eighteenth Centuries*, giving in the latter work much biographical matter concerning English poets.

AUBRY DE MONTDIDIER, a French knight who lived in the times of Charles V., and, as tradition says, was assassinated in the forest of Bondy by Richard de Macaire in 1371. The latter became suspected of the crime on account of the dog belonging to the deceased Aubry invariably displaying towards him the most unappeasable enmity. Macaire was therefore required by the king to fight with the animal in a judicial combat, which was fatal to the murderer. This tale was afterwards, under the titles of *Aubry's Dog*, *The Wood of Bondy*, *The Dog of Montargis*, frequently acted, the "dog" always gaining the greatest share of applause! After being performed with success at Vienna and Berlin, it was appointed to be played at the Weimar theatre, of which Goethe was the manager; but the poet resigned his office before the dog made his *début*.

AUBURN, city and co. seat of Cayuga co., New York, on the outlet of Owasco lake, 173 m. n.w. of Albany, on the New York Central and Hudson River and Lehigh Valley railroads. There are a state armory, an Academy of Music, the Auburn Theological Seminary (Presbyterian), established in 1820, a hospital, an orphan asylum, and a state prison—a large stone structure capable of holding 1000 to 1200 convicts. The city has churches, public libraries, many fine public and private buildings, a statue of William H. Seward, whose home was here, water supply from Owasco lake, and manufactures carpets, iron, woolen and cotton goods, engines, boilers, threshing and mowing machines, farm implements, and paper. Several daily and weekly newspapers are published. Pop. 1890, 25,858.

AUBURN, city and co. seat of Androscoggin co., Me., on the Maine Central and Grand Trunk railroads, 34 m. from Portland. It has extensive cotton and shoe manufactures, a furniture factory, a cotton-mill, a tannery, churches, banks, a high school, circulating libraries, water works, and electric lights. Pop. 1890, 11,250.

AUBUSSON, a t. of the department of Creuse, France, 125 m. w. from Lyon. It is picturesquely situated on the Creuse, in a narrow valley or gorge, surrounded with moun-

tains and rocks. It is a well-built town, consisting chiefly of one broad street. It is celebrated for the manufacture of carpets, which is said to have been introduced by the Arabs or Saracens, who settled here in the 8th century. Tanning and dyeing are carried on, and there is some trade in wine. Pop. about 6400.

AUBUSSON, PIERRE D', grand master of the order of St. John of Jerusalem, was b. in 1423 of an ancient and noble French family. His early history is imperfectly known, but he is said to have borne arms, when very young, against the Turks in the wars in Hungary, and to have distinguished himself by the mingled zeal and valor he displayed. Here he acquired that intense antipathy to the "Infidels" which subsequently animated his whole public career, and gave a peculiar bias to his ambition. Having returned to France, he accompanied the dauphin in his expedition against the Swiss, and was instrumental in securing their defeat at the battle of St. Jacob near Basle. His mind, however, constantly reverted to the ominous encroachments in the east of the dreaded Mussulman, and at last he resolved to betake himself to Rhodes, where he enrolled himself among the brotherhood of Christian knights. Now his history emerges into clear light, and assumes a very considerable importance. He swept the Levant, and chastised the pirates who prowled perpetually among the Greek isles, obtaining the approbation and regard of the grand master. In 1458, by his ardor and address he succeeded in forming a kind of Christian league between the French monarch and Ladislaus, king of Hungary, against Mohammed II. This was the great aim of A.'s life, the "idea" which continually possessed him—viz., the necessity of a vast organization of all Christendom to overthrow the power of the Turks. Step by step, through long years, he won his way to supreme power in his order. In 1476, he was elected grand master. It was a critical period for the civilization and religion of Europe. Constantinople had recently been taken and the Byzantine empire destroyed by Mohammed II. Every day the conqueror marched further w. Thrace, Macedonia, central Greece, Servia, Wallachia, Bosnia, Negropont, Lesbos, and the islands of the Adriatic had been successively conquered by him. Proud of his rapid glories, and sustained by an immense prestige, the sultan threatened to dictate terms from Rome to the entire west. Rhodes, however, stood in his way, the sentinel isle of Christianity, on the great maritime route between Asia and Europe. Mohammed saw that the battle between the two faiths must begin here; and in May, 1480, a Turkish army of 100,000 men, commanded by a Greek renegade, Palæologos, landed in the island, and commenced to besiege the town. Two desperate assaults were made. The Turks, however, were compelled to desist, and sailed away, leaving 9000 dead. Mohammed was enraged, and planned a second expedition, which was interrupted by his death at Nicomedeia in Asia Minor, May, 1481. After this, A. took a leading part in the religious diplomacy of the papal court, and received from the pontiff many honors and privileges. Meanwhile, he exerted himself to improve and strengthen the internal organization of the brotherhood, enriching the diplomatic code of his order with several wise statutes and regulations relative to the election of dignitaries, the finances, etc., and exciting great admiration throughout Christendom. In 1501, he was appointed generalissimo of the forces of the German emperor, the French king, and the pope, against the Turks; and, in spite of his great age, he enthusiastically entered on his duties, and sailed to attack Mitylene; but the expedition failed on account of the discordant aims which the various belligerents had in view. Broken by disappointment and vexation, the grand master returned, and died at Rhodes in July, 1503, at the age of 80.

AUCH, the capital of the department of Gers, in the s. of France, situated on the river Gers, 42 m. w. of Toulouse, lat. 43° 38' n., long. 0° 35' e. Pop. '91, 14,782. It is the seat of an archbishop, and possesses a museum of natural science, together with an old and beautiful cathedral, the painted windows of which are greatly admired. Its chief articles of trade are woolen and cotton stuffs, fruits, wine, and brandy.

In ancient times, it was called *Elimberrum*; at a somewhat later period took its name from the Ancii, whose chief town it was. In the 8th c., it became the capital of Gascony, and later, of the county of Armagnac.

AUCHE NIA (from the Gr. *auchen*, the neck), a genus of ruminating quadrupeds, of which the llama (q.v.) and the alpaca (q.v.) are the best known. The genus is exclusively South American; indeed, the species occur only on the lofty ranges of the Andes. They are nearly allied to the camels, and may be regarded as their representatives in the zoology of America. They form, along with them, the family *camelidæ* (see CAMEL), and were included by Linnæus in the genus *camelus*. They agree with the camels in certain important anatomical characters, particularly in the structure of the stomach; and also resemble them very much in general form, in the long neck, small head, prolonged and movable upper lip, and small apertures of the nostrils. They differ from them partly in dentition, and partly in the more cloven feet and movable toes. The nails, also, are stronger and curved, and each toe is supported behind by a pad or cushion of its own; by all which the feet are admirably adapted for the rocky heights which the animals inhabit. The genus A. is by some naturalists called *llama*.

AUCH MUTY, ROBERT, a lawyer of Scotch descent, b. in England, but a settler in Massachusetts in early life. He was judge in admiralty in 1733, and in 1741 went to

England as colonial agent, where he published a pamphlet on the importance of cape Breton to England, with suggestions for its capture. He died in Boston, April, 1750.

AUCHMUTY, ROBERT, son of Robert the lawyer, also a lawyer in Massachusetts, and admiralty judge in 1767. He was associated with John Adams in the defense of capt. Preston, who was one of the British officers in the "Boston massacre." A. was a strong royalist, and went to England, where he d., 1788. Some of his letters to people in England, which were sent to the colonies by Franklin, created much excitement.

AUCHMUTY, SAMUEL, D.D., 1722-77; son of the first Robert. He graduated at Harvard, and took priest's orders in England. The society for the propagation of the gospel sent him to New York as assistant minister of Trinity parish, and in 1764 he had charge of all the Episcopal churches in the city. When the American revolutionists took possession of the city, he was forbidden to read prayers for the king, but he continued until troops invaded the church and threatened force. He locked the church and chapels, and fled to New Jersey with the keys, ordering that no church should be opened until the forms of prayer could be read without abridgment. A few months later the British took the city, and A. worked his way through the American lines, with great difficulty, just after his church and all its records had been destroyed by fire. He preached only one more sermon, in St. Paul's, was taken ill from exposure and hardship, and died a few days later.

AUCHMUTY, Sir SAMUEL, 1758-1822; son of Rev. Samuel. He was a graduate of King's (Columbia) college, and went into the English service in 1776; was in the battles of Brooklyn and White Plains, and served in three campaigns. Having risen to a captaincy, he served in India from 1783 to 1796, participating in the siege of Seringapatam. In Egypt, in 1800, he was Abercrombie's adjutant-general; and a brigadier-general in South America, where, in Feb., 1807, he took by assault the fort and city of Montevideo, for which parliament voted him thanks. In 1810, he commanded in the Carnatic, and the next year reduced the Java settlements, and was again voted thanks. In 1813, he held the chief command in Ireland.

AUCHTERARDER, a village in the s.e. of Perthshire, on the w. side of the Scottish Central railway. Pop. '91, 3000, chiefly employed in cotton-weaving. The popular opposition to the presentee to the church of A. originated (1839) the struggle which ended in the secession from the church of Scotland and the formation of the free church in 1843.

AUCKLAND, the northern provincial district of New Zealand, includes fully a half of North island, and is about 400 m. long by 200 wide, at its greatest breadth. A. has a coast-line of nearly 1200 m.; and is, in addition, remarkable for its rivers, which serve as carriage-ways for the produce of the interior. It has several safe harbors. Pop. '96, 153,564. There are three almost natural divisions of this province: North Peninsula, East Coast, and the Waikato Country — the latter two being mainly in the hands of the natives. Gold, copper, tin, iron, coal, and other minerals exist in A. Gold is largely produced in the Thames district. A. is very rich in timber, the most important tree being the kauri pine. The fossil gum found wherever the kauri forests have been, is an important article of export. The government grants the right, at a low price, to cut the *phormium*, or New Zealand flax, which grows on waste districts. The rearing of live-stock is more attended to than the cultivation of cereals. The principal agricultural products are wheat, oats, barley, hay, and potatoes.

AUCKLAND, city of New Zealand, capital of the above-named province, in lat. 36° 50' s., and long. 174° 50' e., was, till 1865, capital of New Zealand, when the seat of government was transferred to Wellington, the chief city of the province of the same name. A. is distant from Sydney 1236 m.; from Melbourne, 1650; and keeps up steam communication with these two cities. Picturesquely situated, its position for commerce is also excellent, as, in addition to its harbor at Waitemata, it possesses also a western harbor, the Manakan, 6 m. distant. There is a wharf 1690 ft. in length. It is surrounded by numerous thriving villages, with several of which it is connected by railway. A. contains a well laid out botanical garden, and shows numerous public buildings, government house, barracks, etc. It supports two daily papers. In 1895 the number of in-coming vessels was 250, with a tonnage of 267,983; of out-going, 235, with a tonnage of 215,501. A. was founded in 1840. Pop. '96, 31,424; but including the suburban districts, 57,616. The temperature appears to be singularly equable. The mean of the coldest month is 51° F., and that of the warmest 68°. The annual rainfall is 43½ in.; and the days of rainfall average 100.

AUCKLAND, BISHOP, a small t. in the middle of the co. Durham. Pop. '81, 10,087. It stands on an eminence, 140 ft. above the plain of the Wear. A. contains the abbey-like palace of the bishop of Durham.

AUCKLAND, Lord WILLIAM EDEN, an able statesman and diplomatist, third son of Sir Robert Eden, bart., of West Auckland, Durham, b. in 1744, educated at Eton and Oxford, and called to the bar in 1768. In 1772 he was appointed under-secretary of state, and afterwards filled the positions of a lord of trade, a commissioner to treat with

the insurgent colonists of North America, chief secretary to the lord-lieutenant of Ireland, minister-plenipotentiary to France (concluding a commercial treaty with that country, 1786), ambassador to Spain, ambassador to Holland, and joint-postmaster-general. In 1788, he was created an Irish peer as baron A.; and in 1793 he was made a British baron. He d. suddenly, May 28, 1814. A. was the author of the *Principles of the Penal Law* (1771, 8vo); *Remarks on the Apparent Circumstances of the War* (1795); *Speech on the Income-tax* (1799); *Speech in Support of the Union with Ireland* (1800); and other pamphlets.

AUCKLAND, Earl of, GEORGE EDEN, governor-general of India, son of William Eden, lord Auckland, b. Aug. 25, 1784, succeeded his father in 1814 as lord A.; and in Nov., 1833, joined earl Grey's administration. In July following, in viscount Melbourne's first ministry, he became first lord of the admiralty. He vacated that office in Nov. of the same year, but was appointed to it again in 184C. In 1835, he went out to India as governor-general. He returned to England in 1841, and died unmarried, Jan. 1, 1849.

AUCKLAND ISLANDS, a group of islands to the s. of New Zealand, being about the 51st parallel s., and the 167th meridian e. The largest of them measures 30 m. by 15. It has two good harbors, and is covered with the richest vegetation. The government of New Zealand has established on it a depot containing provisions and clothing for shipwrecked sailors.

AUCTION (Lat. *actio*). The character of this convenient mode of offering property for sale is correctly indicated by the name. The Latin word *actio* means "an increasing or enhancement," and an A. is an arrangement for increasing the price by exciting competition amongst purchasers. What is called a *Dutch auction*, in which the usual mode of proceeding is reversed, the property being offered at a higher price than the seller is willing to accept, and gradually lowered till a purchaser is found, is thus no A. at all in the original and proper sense of the term. The A. is of Roman origin, and is said to have been first introduced for the purpose of disposing of spoils taken in war. Such sales were said to take place *sub hasta* (under the spear), from the custom of sticking a spear into the ground, probably to attract purchasers to the spot. "Conditions of sale," or "articles of roup," as they are called in Scotland, constitute the terms on which the seller offers his property, and form an integral part of the contract between seller and purchaser. The contract is completed by the offer or bidding on the part of the purchaser, and the acceptance by the seller or his representative, which is formally declared by the fall of the auctioneer's or salesman's hammer, the running of a sand-glass, the burning of an inch of candle (hence the term "sale by the candle"), or any other means which may have been specified in the conditions of sale. These conditions or articles ought further to narrate honestly and fully the character of the object or the nature of the right to be transferred, to regulate the manner of bidding, prescribe the order in which offerers are to be preferred, and to name a person who shall be empowered to determine disputes between bidders, and in cases of doubt to declare which is the purchaser. Before the sale commences, these conditions, which are executed on stamped paper, are read over, or otherwise intimated to intending purchasers. The conditions, thus published, cannot be controlled by any verbal declaration by the auctioneer. The implied conditions, which, in addition to those thus expressed, are binding on the seller and purchaser in all auctions, are: 1. That the seller shall not attempt to raise the price by means of fictitious offers, but shall fairly expose his goods to the competition of purchasers; and 2. That the purchasers shall not combine to suppress competition. Much doubt has arisen as to the lawfulness of biddings for the exposer. The exposer may set a price below which the thing is not to be sold, which is best and most openly done by fixing an upset price, or he may expressly reserve to himself a power to offer. "But if the sale is declared to be without reserve, or at the pleasure of the company, the plain meaning and effect of this, even in England, is held to be to bar all biddings in behalf of the seller." In Scotland, the law condemns absolutely such interference. "It has been said that if there be no upset price, and no agreement to sell at the pleasure of the company, the owner may bid, but that is not law, or is at least too broadly laid down." Bell's *Commentaries*, i. 97, edit. 1858. The A. duties were repealed by 8 and 9 Vict.

AUCTION, AND AUCTIONEER. Auctions are generally conducted by specially licensed auctioneers. In the U. S. the only conditions of such sales are those printed in the advertisements or catalogues of sale, or announced by the auctioneer at the time of sale. In general, the auctioneer acts as agent of both parties. A memorandum of the sale and its terms, duly made and signed by him, binds both buyer and seller. A bidder may retract his offer before acceptance, which is usually signified by the dropping of the auctioneer's hammer. The auctioneer has a lien upon the goods for his charges. If the goods sold have been stolen, the auctioneer is liable to the owner. He is bound to sell to the highest *bona fide* bidder, unless such person bids below a previously announced upset price (see *ante*). While the employment of "puffers," or persons who make fictitious bids for the purpose of unfairly raising the price of the article sold, may render a sale void, yet the seller is allowed to have persons bid in his interest to prevent a sacrifice of his property under a given price. Unfair conduct on the part of purchasers will also avoid the sale; so, error in the description of real estate, if it be material.

AUCTIONEER, the person who conducts an auction (q.v.). The A. is in a certain sense the agent both of seller and purchaser, and by the fall of his hammer, or by writing the purchaser's name in his book, he binds him to accept the article sold at the price indicated. The A. may also, and frequently does, act as agent for absent purchasers, or for persons who have instructed him to make biddings for them during the sale. In both cases, however, the purchaser must be *bona fide*, otherwise the A. would himself become a "puffer." As to the circumstances in which he may bid for the seller, see **AUCTION**. Where the A. declines or omits to disclose the seller's name, he undertakes his responsibilities to the purchasers. To the seller, again, he is responsible for ordinary skill, assiduity, and prudence.

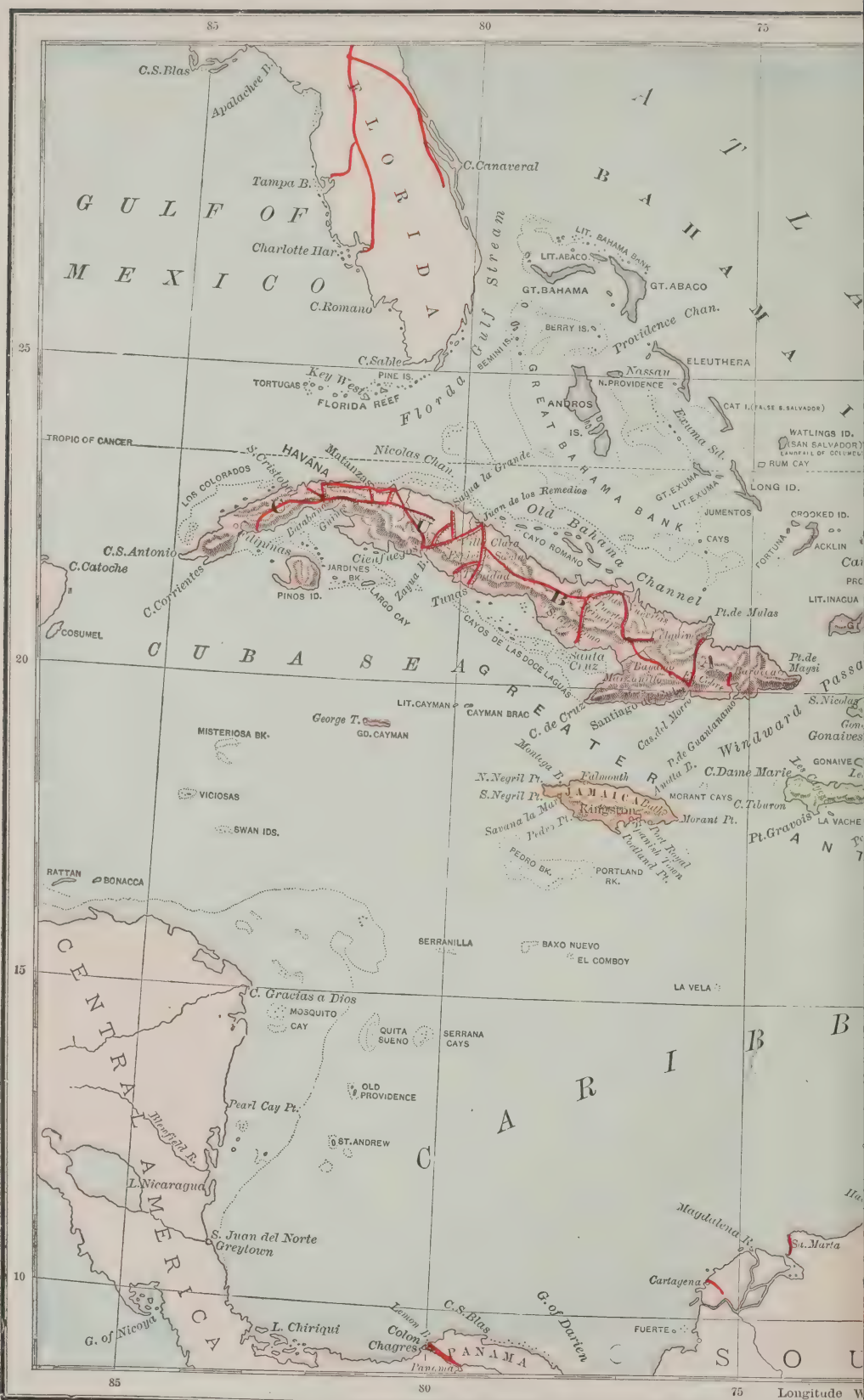
AUCUBA, a genus of plants of the natural order *cornaceæ* (q.v.), of which the only known species is *A. japonica*, an evergreen shrub resembling a laurel, but with dichotomous or verticillate yellow branches, and, as seen in Europe, always with pale green leaves curiously mottled with yellow. It is dioecious, produces its small purple flowers in summer, and ripens its fruit, a small red drupe, in Mar. It is a native of China and Japan, and was originally introduced into Britain as a stove-plant, but is found to be at least as hardy as the common laurel, and is now a very common ornamental shrub; especially in the suburbs of large towns, a sort of situation for which it is particularly adapted, as it is very little liable to suffer injury from smoke. It is often called the variegated laurel. The mottled appearance of the leaf is said, however, not to belong to the plant in its ordinary natural state; but only this variety has yet been brought to Europe, and of it only the female plant.

AUDE'US, AUDI'US (or, according to his native Syriac name, *Udo*), the founder of a religious sect in Mesopotamia, flourished during the 4th century. He commenced by accusing the regular clergy of worldliness, impure morals, etc., and is said to have opposed to their manner of life a strict asceticism, until his conduct seemed dangerous to the welfare of the church, when he was excommunicated. His disciples, who were pretty numerous, now clung more closely to him, and he was elected their bishop. In 338 A.D., he was banished to Scythia, where he instituted a kind of rival church, and where he died about 370 A.D. Our knowledge both of his character and opinions is derived solely from inimical authorities, such as Augustine, Athanasius, etc., and is therefore to be accepted with caution. But his labors amongst the fierce barbarians in the north are acknowledged to have been beneficial, and one writer, Epiphanius, states that he ought to be considered *schismatical*, but not *heretical*. But if the leading feature of his system was, as is alleged, a decided tendency to anthropomorphism, we cannot see—according to the principles upon which the church usually proceeded—why he should not have been so called. He is said to have held that the language of the Old Testament justifies the belief that God has a sensible form—a doctrine deemed heretical in all ages of the church's history. This particular tenet took firm hold on many minds, and in the subsequent century, was widely spread through the monasteries of Egypt.

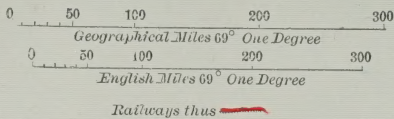
AUDE (*Atax*), a river in the s. of France, rises in the east Pyrenees, not far from mont Louis; flows for some time parallel to the canal of Languedoc; and falls into the Mediterranean 6 m. e.n.e. of Narbonne, after a course of more than 120 miles.

AUDE, a maritime department in the s. of France. It comprises some old "counties" which formerly constituted a portion of the province of Languedoc. Pop. '96, 310,513. Area, 2438 sq. m. The southern part of A. is mountainous, but the greater portion of it belongs to the valley of the lower A. and the canal of Languedoc. Its northern boundary is formed by the Black mountains, the most southerly offshoots of the Cevennes. The coast is flat, with no bays or roadsteads, but several lagoons. The climate is warm, but variable. The mountains are composed of granite, while the soil of the plains is chiefly calcareous, and about the coast—where salt and soda are procured—is extremely fertile, producing cereals, olives, fruits, and wines. A. is rich in iron and coal, and mineral springs. The woolen and silk manufactures are of considerable value. There is likewise a considerable export of corn, honey, etc. The chief town is Carcassonne.

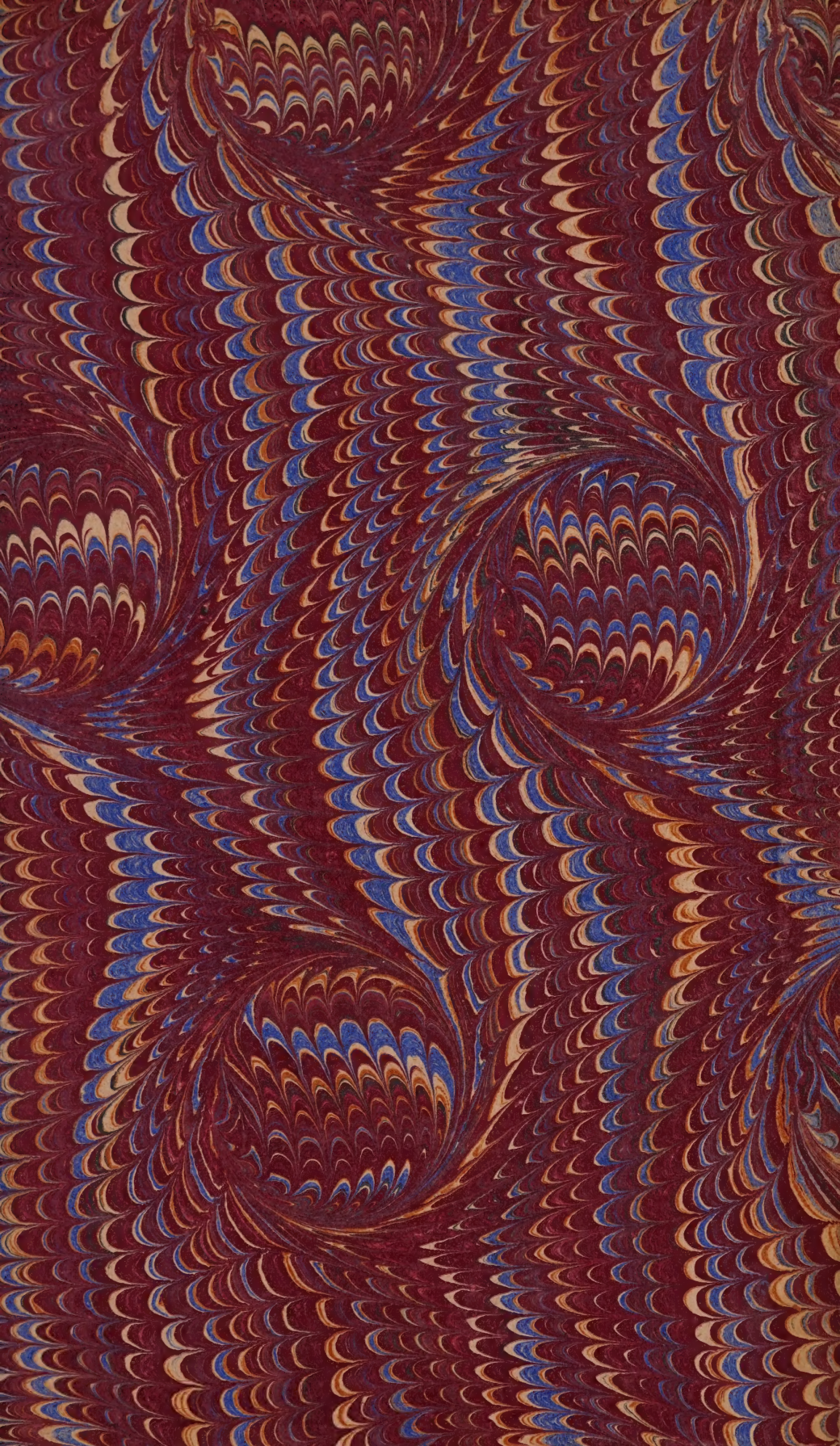
AUDEBERT, JEAN BAPTISTE, a distinguished French naturalist, was b. in 1759 at Rochefort; studied the arts of design and painting at Paris, and in early life attained a degree of eminence as a miniature painter. Indulging a predilection for the study of natural history, he was much employed by naturalists in painting the more rare and beautiful objects in their collections. In 1800, after having visited England and Holland for the purpose of making sketches, he published at Paris, on his own account, a splendid volume, which raised him at once to celebrity, both as a painter and author. This work, the *Histoire Naturelle des Singes, des Makis, et des Galéopithèques* (Natural History of Monkeys, Lemurs, and Flying Lemurs), was a large folio, with 62 colored plates, remarkable alike for their truth and beauty. His method of color-printing in oil, which was then novel but now common, was to dispose all the colors on one plate instead of using a separate plate for each color. His use of gold and bronze in the illustrations and letterpress was then also as new as it is attractive. In his *Histoire des Colibris, des Oiseaux-mouches, des Jacamars, et des Promérops* (Natural History of Humming-birds, Jacamars, and Promeropses), he succeeded by the same process in giving to his plates even a greater brilliancy and finish. He d. in 1800.



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